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A QUARTERLY JOURNAL OF NATURAL HISTORY FOR THE NORTH OF ENGLAND

The Further Decline of Black Grouse in the Peak District 1975–1985 — *D. W. Yalden*

The Insect Fauna of Common Rock-Rose *Helianthemum chamaecistus* Mill. around Stamford, Lincolnshire — *B. N. K. Davis*

A New Species of *Poecilochirus* (Acari: Parasitidae) from Yorkshire — *Keith H. Hyatt*

Entomological Reports for 1973–1983 Coleoptera: Part 2, Haliplidae — Scolytidae — *J. H. Flint*

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THE FURTHER DECLINE OF BLACK GROUSE IN THE PEAK DISTRICT 1975–1985

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Introduction

As a result of detailed counts made by my colleagues in 1973–1975, we were able to assess the status of the Black Grouse *Lyrurus tetrix* in the Peak District of England at that time; our 'best estimate' was of 65 cocks and, assuming a 1:1 sex ratio, a total population in spring of around 130 birds (Lovenbury *et al.* 1978). The drastic decline of the species in Cheshire and Derbyshire was documented, but we observed that the population in the Staffordshire sector of the Peak District had apparently stayed fairly steady in post-war years. This relative stability of the Staffordshire section of the population, in contrast to the decline of the Derbyshire and Cheshire segments, was attributed to the relatively stable habitat conditions which also obtained in Staffordshire but not in the other two counties.

Unfortunately, the situation in Staffordshire has not remained constant in the subsequent decade; the Black Grouse population has declined markedly, largely as a result of accompanying habitat changes. This paper, then, is a sequel to the earlier report, documenting the habitat changes, the decline in Black Grouse numbers through the decade, and the current (1985) situation.

Methods

A number of ornithologists have kept various segments of the local Black Grouse population under surveillance during the decade; in particular, C. Linfoot and E. Gibson have supplied detailed counts for some sites. The most valuable records are counts of males displaying at the leks, but not all leks have been surveyed each year. In April 1985, M. Waterhouse (R.S.P.B.) organised a group of 29 local naturalists to undertake a simultaneous count at all lek sites on one morning and he also made counts himself in 1984 and 1985 at many leks. Miscellaneous counts from other ornithologists, myself included, and my own notes on habitat changes, have been incorporated in this account.

One continuing problem has been the level of disturbance from visiting bird-watchers, who have come from as far away as Essex, Surrey and Norfolk; it is rare now, at a weekend at any time of the year, to visit the principal remaining site without finding other bird-watchers already present. (Despite this and an appeal in *British Birds*, no information on numbers of Black Grouse seen has come from other than local naturalists.) Precise locations have therefore been withheld; lek sites are referred to by letter, continuing the coding of the previous account.

Results

Cheshire In the period since the previous account, the species which was already apparently extinct as a breeding bird has apparently disappeared completely from the county. A little more historical evidence has become available concerning previous locations. In Lyme Park, occasional sightings in 1947–1949, and a cock on one date in 1952, were followed by nine records of one or two birds in the 1960s, culminating in six or seven sightings in 1970, but none since (Mrs K. Penney *in litt.* 17.iv.78). The annual county bird reports have single records for 1979 (two females) and 1980 (one female), both in winter in the Macclesfield Forest area, but no records at all since then (Cheshire Bird Reports 1978–1982). Fieldwork for a tetrad-based atlas of breeding birds, carried out from 1978 to 1984, yielded no records of the species in the county at all during the breeding seasons (Elphick *et al.* in prep.).

Derbyshire The situation in the mid-1970s was of only two small populations, one in the Goyt Valley area and the other in the north-east of the county (Frost 1978, Lovenbury *et al.* 1978). In the Goyt Valley, the highest number of cocks seen on any one date has declined fairly steadily from 8 in 1973 to 5 in 1974, only 1 in 1975 then 3, 6, 2, 1, 2, 1, 1, 1, and 1 in subsequent years up to 1984 (Derby. Bird Reports; G. Howe, A. Booth, J. V. Oxenham *pers. comm.*). The situation in N.E. Derbyshire is a little less readily disentangled due to an understandable reluctance to disclose specific sites and counts. Nevertheless, the numbers of cocks reported each year in the period 1977–1983 from this general area did not exceed 3 (in 1980 and 1981). The report of 18 cocks in 1976 looks erroneous in the light of both previous and subsequent figures (Derbyshire Bird Reports; Sheffield Bird Reports). Subsequent information clarifies the situation somewhat. One lek site increased from 1972 to 1976, when a peak of 9 cocks was counted, but then declined to only 2 cocks in 1985 (G. Mawson *pers. comm.*). A second, scattered, lek seems to have increased slowly from 1–2 cocks in 1975–76 to possibly 5 cocks in 1985. There seems no reason to believe that the Derbyshire population of Black Grouse exceeds 8 cocks at present (by implication, 16 birds); even this represents a decline from the 10 cocks estimated in 1973 (Lovenbury *et al.* 1978).

Yorkshire Single sightings in the Yorkshire area of the Peak District on 6 Dec. 1975 and 7 Mar. 1976 are the only recent records, and there is no evidence of the species breeding in the south of the county (Sheffield Bird Reports, Hornbuckle & Herringshaw 1985).

Staffordshire Information for the Staffordshire area of the Peak District is of two kinds. Some major leks have been under regular observation for most of the period 1977–1983 and these counts are useful for documenting the time of the declines (E. Gibson, C. R. Linfoot *pers. comm.*). In 1984 and 1985, attempts were made to visit all the possible lek sites, culminating in a simultaneous count by 29 volunteers on 28 April 1985 (M. Waterhouse *pers. comm.*). These counts enable a direct comparison with the counts obtained in 1973–1975. Information from the Annual Reports of the West Midland Bird Club, and my own notes, are also incorporated (Table 1).

The area including leks A and B held, we thought, 12 cocks in 1973. Up to 7 cocks were present at lek A in 1975, but it is reported that birds were shot on this lek in 1976. Since that time, the highest number reported was 2 cocks in 1983; in 1984 and 1985, only a single cock was present at one lek, and none at the other.

The area of leks C, D and E held about 13 cocks in 1973–1975, the counts being somewhat confused because of the degree of interchange observed between these leks. In 1976 and 1977, there seemed to be a shift of the centre of activity of this sub-population, away from leks C and D toward lek E. This change seems to have been associated with the growth of a young conifer plantation, and its ground vegetation, which had been planted nearby in 1972. The attendance of cocks at this lek increased from 6 in 1976 to 9, 11 and 9 in 1977–1979, but then declined sharply to 4 in 1980 and 1981, 1 in 1982, and none in 1983; there were no cocks on any of the leks C, D and E or their neighbourhoods in 1984 and and only one seen in 1985. Here too, there are reports of considerable human disturbance and persecution. In 1980, lambing of sheep in the field used by lek E, and disturbance from bird watchers, had caused the birds to disperse to alternative fields, and in the winter of 1981–1982 it is reported that 2 cocks and 3 hens were shot nearby. One version of this story alleges that they were shot because the farmer was no longer willing to tolerate trespassing bird-watchers trying to get close views of the birds.

At lek F and the associated lek G, the population of around 13 cocks in 1973–75 remained steady until at least 1981 or 1982, when 13 and 11 cocks, respectively, were recorded. There is some indication of a subsequent decline, however, with 5 cocks in 1983, but 6 in 1984 and 9 in 1985.

The small leks H-M have not been counted regularly. They held a total of 17 cocks in 1973–75, with no more than 4 cocks at any one site. In 1984 and 1985, these sites collectively held 9 and 8 cocks, respectively, with 4 again the highest figure at any one site.

TABLE 1

Population (counts of displaying cocks) of Black Grouse at lek sites in the Peak District. 1973–1975 counts from Lovenbury *et al.* 1978. Highest counts in any one season are given for other years.

Lek	1973–1975 Highest	1973–1975 'Best Count'	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985
A	9	11	–	–	–	–	–	1	1	2	1	1
B	5		–	–	–	–	–	–	–	–	0	0
C	9	12	–	–	–	–	–	–	–	–	0	0
D	3											
E	6	1	6	9	11	9	4	4	2	–	0	1
F	10	13	–	6	–	9	8	13	11	5	6	8
G	6		–	–	–	–	–	–	–	–	0	1
H	4	4	–	–	–	–	–	–	–	–	4	0
I	1	1	–	–	–	–	–	1	1	–	1	2
J	3	3	–	–	–	–	–	–	–	–	0	3
K	3	3	–	–	–	–	–	–	–	–	1	1
L	2	2	–	–	–	–	–	–	–	–	2	2
M	4	4	5	–	–	–	–	1	–	–	1	0
Staffs Total	65	55										
N	8	8	3	6	2	1	2	1	1	1	1	0
O	2	2	10?	1	0	1	3	3	–	1	–	5
P	–	–	8	–	–	–	–	–	–	–	–	2
Peak Total	75	65										27

Causes of Decline

In the previous report (Lovenbury *et al.* 1978), information on the habitat requirements of Black Grouse, culled from the general literature on the species, was used to try to explain the decline of the Black Grouse in Derbyshire, and the then relative stability of the species in Staffordshire. The complex habitat requirements of the species were emphasized — it is clearly a bird of the moorland fringes, requiring pasture, moorland and scrubby woodland, and moreover requiring these to be mixed in a tight habitat mosaic. It was suggested that, in particular, this mosaic had persisted in the Staffordshire moorlands, whereas it had been replaced in the former Derbyshire sites by large blocks of uniform habitat. The particular needs of the species which each of these components supplies is still not clear; the explanations advanced by Lovenbury *et al.* (1978) have been criticised by some Derbyshire ornithologists (Lichfield 1977a,b; Kitchen 1978a,b; Alfeton W. E. A. 1979) and defended (Yalden 1979). The requirements may include clear visibility at the leks, provided by the pastures; good escape routes and cover nearby, provided by moorland and woodland; safe roost and nest sites, provided by the ground vegetation of meadows, moorland and woodland; nutritious food in spring, prior to egg-laying, from, especially, bilberry shoots, cotton-grass flowers and clover shoots in the moorland and pastures; berries in the autumn, mostly from moorland (bilberry, crowberry, cowberry) but also from woodland and scrub (rowan, hawthorn); and 'winter emergency' food, when the ground vegetation is snow-covered, in the form of birch buds and catkins, larch shoots and pine shoots (Lovenbury *et al.* 1978, Cramp and Simmons 1980, N. Piccozzi *pers. comm.*). To these may be added, as a result of recent work in the Netherlands, an adequate supply of insects, from damp grasslands, for the young chicks in their first 3 weeks of life (Niewold, 1982).

It is clear that some of the decline of the Staffordshire Black Grouse population can be ascribed directly to shooting. However, one would expect a healthy population, one moreover dispersed over approximately 85 km^2, to be able to recover from such mortality so long as the habitat remains suitable. The fact is that there have also been very considerable changes in the habitat of this area in the intervening period, so many, in fact, that it is still difficult to ascribe the decline of the species to any one cause.

The decline has been most severe in the area around leks A-E, where the population has collapsed from 25 cocks to 1 cock — that is, roughly half the former population has been lost. This is the area, west of the Buxton-Leek A. 53 road, where habitat change has been most marked. In Oct. 1977, the moorland of the Swythamley Estate, totalling around 550 ha, was sold to sheep farmers, following the death in January 1975 of the former owner, Sir Philip Brocklehurst. The main blocks of moorland, 82 ha on Back Forest and 251 ha on the Roaches, plus a small area of 28 ha on Hen Cloud, formed part of one sheep run; between 800 and 1200 sheep grazed this area from January 1978, through the severe winter of 1978–79, until March 1980. At this point, the Peak Park Planning Board bought the moorland to prevent further deterioration of the heather and ensure public access to the area. Subsequently, about 300 sheep have been grazed in summer only on the Roaches, but none at all (except for 20 or so 'trespassers') on Back Forest. The moorland showed severe signs of grazing damage in 1979, and the bilberry in particular has not really recovered its full vigour 6 years later. Birch and pine scrub was also severely affected, with a pronounced browse line appearing at 1.3 m which is still evident in 1985. With the increased publicity, and the opening and expansion of a large Youth Hostel and campsite at Gradbach, public use (disturbance) of the area is much more severe now. It is difficult to know which of these changes have most affected use by the Black Grouse of this area, but it has certainly declined. In the years 1969–72, I made 37 visits to the Back Forest area, and saw Black Grouse on 24 of them, for a total of approximately 159 bird-days; in the years 1978–85, on 96 visits, I saw Black Grouse on only 8 days, for a total of 14 bird-days. These sightings were mostly in winter, particularly in snowy weather, and the presumption has been that Black Grouse use (or used) the area mainly as a feeding area in bad weather.

Another part of the former Swythamley Estate, 75 ha of moorland on Gun Hill, also

contained a small conifer plantation with stunted Scots Pine and a lush ground cover of bilberry. This area was stocked with about 300 sheep, from 1978, and still receives very heavy grazing. The scrub has been severely browsed, there is a pronounced browse line at 1.5 m, and all the ground cover in the wood has gone; on the moor, all of the old heather has been very badly trampled and broken, so that the ground it occupied is now 40% bare. To the south of the road, a small triangle, formerly with 30 ha of rich moorland vegetation with bilberry, cowberry, gorse and some birch scrub, was fenced in 1980, heavily grazed with horses, then manured, ploughed, drained and reseeded in 1984.

The changes on Gradbach Hill, adjoining Back Forest, have been less dramatic, but no less severe. Formerly covered in heather, the hill has been subjected to increasingly severe grazing from sheep and cattle, so that the top of the hill now appears to be a poor *Molinia* grassland. In 1971 (17 April), I counted 15 cock Red Grouse (and 6 hens) while walking it, and considered it to be 75 ha of heather moorland; in 1985, I counted no Red Grouse on a similar walk, and thought the heather cover reduced to 10 ha.

Mention was made of the shift of Black Grouse population in 1976–77 toward the young conifer plantation which had been planted up, on rough pasture, in 1972. Initially this was fenced, and sheep excluded. About 1980, however, the fencing became dilapidated, and was not renewed; by that time, the trees were large enough to survive without protection. This has, inevitably, caused a deterioration in the ground cover of the plantations; if this was important as nest cover or roosting cover, it is no longer available.

To the east of the A.53 road, habitat changes have been much less marked, though by no means absent. A small birch wood, much favoured by the Black Grouse, was fenced in 1981, and grazed quite heavily by cattle in late 1981 and 1982. The adjoining moor, burnt (probably accidentally) in 1978, was recovering well, but was heavily grazed by cattle in 1984. Deep drainage ditches were dug in 1983–84, and two rushy fields which the grouse used have been reseeded. In compensation, however, another formerly rather derelict wood has been fenced and replanted, and now has a thick tangle of scrub and ground vegetation. The total area of moorland is also largely intact, though subject in 1984 and 1985 to much more severe, and more pervasive, disturbance from army training.

In the area of the North Staffordshire Moorlands generally, there has been considerable drainage and reseeding of pastures. Many fields, formerly left until July for a hay crop, are now mown in June for silage. We are not sure what effect this may have had on Black Grouse, but they are an indication of the greater pressures on the habitat. A more detailed survey of habitat change in this area is required.

Discussion

It is quite clear from the results given of the various surveys that the Black Grouse has not recovered in numbers in Derbyshire, though it is not quite extinct there; in Cheshire and the Yorkshire part of the Peak District, it is extinct. In Staffordshire, the population has declined sharply between 1975 and 1985; it is now 35% of its former size.

There are allegations of birds being shot at at least three sites, and this has undoubtedly not helped to maintain what was in any case a small population. Nevertheless, a healthy population should be able to recover from such mortality, and one is bound to suspect that various habitat changes have had a more severe effect. The severe damage to or loss of some areas of moorland and scrub to the west of the A.53 have certainly deprived the species of food and cover. The bird is a shy one — it has never been easy to watch Black Grouse feeding, for example — and the increased disturbance from campers, hikers, bird watchers and trainee soldiers has undoubtedly not helped. It is surely significant that all these changes have been more severe to the west than to the east of the A.53, and that is where the population decline has been most complete. In 1978, we hoped that the habitat mosaic needed by the species would continue to survive; to the west of the A.53, it has been severely disrupted. At present, the habitat just about survives, but is under increasing agricultural and other pressures. It is surely indicative that none of the ground west of the A.53, and little of the important ground (not even the main lek site) east of

that road, was included in the Leek Moors S.S.S.I. when established in the 1960s, and it still is not so scheduled. The species certainly needs much more active protection than it has so far received, including some designated sanctuaries and general protection for its habitat. It may be already too late to save it, but certainly efforts made so far are quite inadequate.

Summary

(1) The Black Grouse is extinct in Cheshire, and reduced to fewer than 20 birds in Derbyshire.

(2) In Staffordshire, formerly the stronghold of the species in the Peak District, it has declined sharply between 1975 and 1985. In particular, the western half of the Staffordshire population has all but disappeared.

(3) The area occupied by that western section has suffered severe losses and changes of habitat. There has also been a marked increase in disturbance, and some direct persecution.

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I am very conscious of the fact that very little of the information in this paper comes from my own field work. I am therefore most grateful to numerous ornithologists and others who have willingly given me the results of their own field work, discussed habitat changes and undertaken special counts. In this I include A. Booth, E. Gibson, F. C. Gribble, Mrs K. Hollick, J. Hornbuckle, G. Howe, C. R. Linfoot, G. Lovenbury, G. Mawson, J. V. Oxenham, J. Perkins, P. Shooter and M. Waterhouse, together with various assistants and informants whom I do not know personally.

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THE INSECT FAUNA OF COMMON ROCK-ROSE *HELIANTHEMUM CHAMAECISTUS* MILL. AROUND STAMFORD, LINCOLNSHIRE

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Introduction

Common rock-rose is a widely distributed plant of shallow chalk and limestone soils in England and Wales. Several species of insects are restricted to *Helianthemum* or are closely associated with it (Proctor 1956). During 1977–84, a study was made of the insect fauna of rock-rose occurring on the oolitic limestone around Stamford, Lincolnshire. About 65 distinct populations of this plant were mapped here by Davis & Jones (1982), spanning the four counties of Cambridgeshire, Leicestershire, Lincolnshire and Northamptonshire. Many of these populations were very small and restricted to road verges, quarries and the steeper slopes of unimproved grassland, but two particularly large populations occurred at Barnack Hills and Holes National Nature Reserve and at Colyweston SSSI. This paper describes the occurrence, phenology and feeding behaviour of the fauna. The dispersal and distribution of species in relation to the size and isolation of rock-rose colonies will be reported separately.

Methods

The fauna was recorded at 33 sites altogether between 1977 and 1984, by visual searching, especially for caterpillars, mines and galls, backed up by suction samples (0.09 m^2) for the more active and less conspicuous species. For quantitative site comparisons in 1978 and 1979, four visits were made, when searching times ranged from 8 to 80 minutes at the smallest and largest sites, with 4 to 40 suction samples respectively. In 1980, weekly visits were made between 1 May and 12 September to Barnack (except for a 12 day gap in mid July) when 40 suction samples were taken followed by 20 minutes searching. Caterpillars were reared for identification and to determine the dates of adult emergence. Several hundred seed capsules were collected and either dissected or kept for insects to emerge.

Results

The following account describes 37 species of insects, 11 parasitoids and 2 mites which were associated with *H. chamaecistus*. Of these, 3 Homoptera, 1 Heteropteran, 3 Lepidoptera, 5 Coleoptera, 1 Thysanopteran and 1 Dipteran are considered to be largely or entirely dependent on this host plant. The occurrence of the more common species between 1 May and 10 September is shown in Figure 1; data from outside this period are given in the text.

Homoptera

Aphis helianthemi Ferrari

This small green aphid lives on the young shoots and twisted flower stalks. Colonies were recorded most weeks between 23 May and 17 July at about a dozen sites in the four counties. They are inconspicuous, but attention was often drawn to them by their attendant ants. The species is known from Bedfordshire, Hertfordshire, Derbyshire and Glamorgan (Stroyan *pers. comm.*).

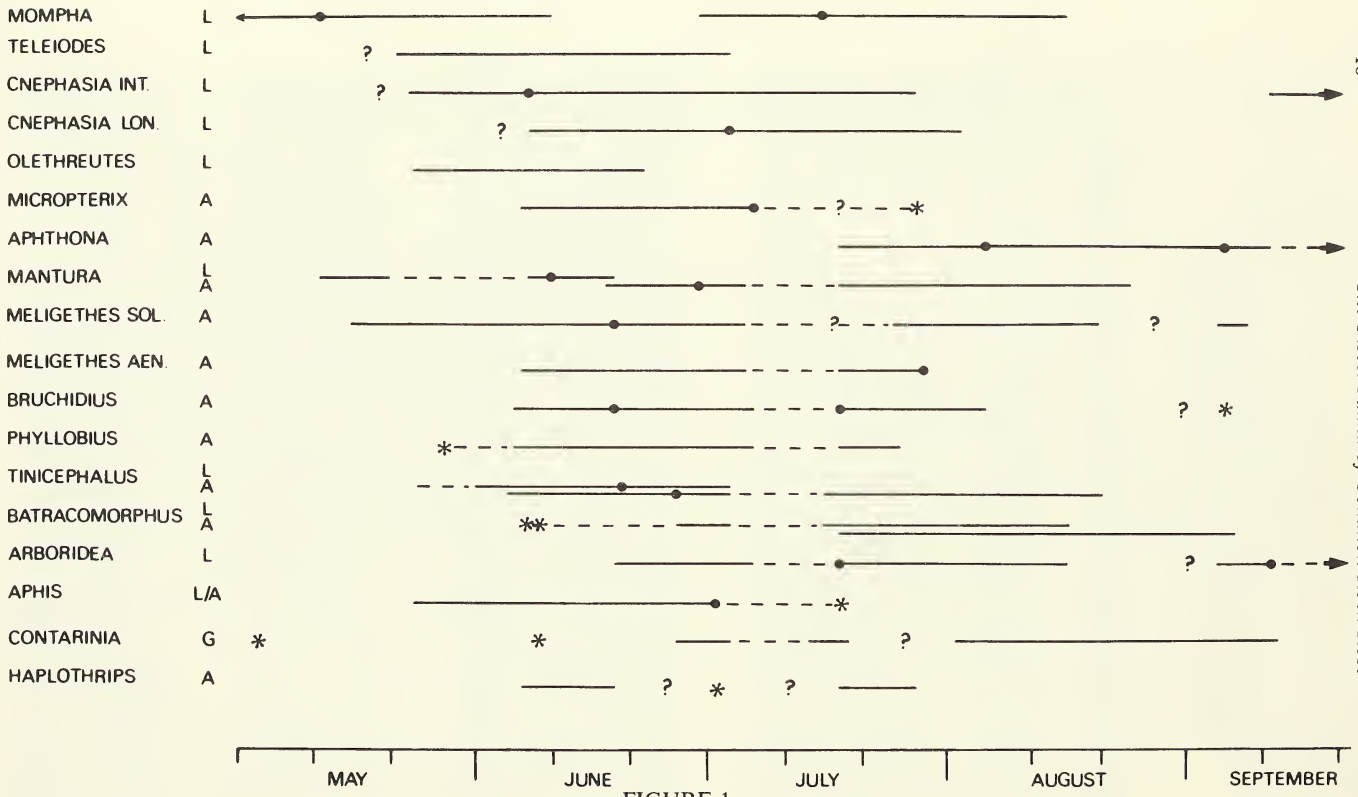

FIGURE 1

Periods during which insects were found on *H. chamaecistus* based on six years' sampling.

A = adults; L = larvae, for Lepidoptera, the last dates shown are those for pupation; G = galls; * outlying records; ● largest numbers recorded; ---no data, but presumed presence throughout period; ? no data, but presumed presence for some of this period.

Philaenus spumarius (L.)
'Cuckoo-spit' larvae were noted during June but not consistently recorded. Highly polyphagous.

Arboridea parvula (Boheman)
This was widespread and on most of the larger sites. It was recorded between 18 June and 16 August in small numbers, and again from 4 September, with large numbers in the second week. The larvae were not identified.

Batracomorphus irroratus Lewis
The bright green larvae and adults (4–5 mm) with fine black dots are easily recognised. Larvae occurred from about 7 June to 16 August; adults from mid July to early September, with a peak in early August. At fourteen sites.

HETEROPTERA
Tinicephalus hortulanus (Meyer-Dür)
Yellow-green bugs (3.5–4 mm) with rusty tint on forewings, and brown tarsi. Common on most sites. Larvae were recorded from 29 May to 18 June, adults from about 12 June to 5 August. Said to feed also on *Ononis* and *Origanum* (Richards, in Proctor 1956).

Plagiognathus chrysanthemi (Wolff)
Distinguished from the last species by the black spots on the hind femora and tibiae in the larvae and adults. Equally abundant on rock-rose at Barnack but about a fortnight later. Polyphagous.

LEPIDOPTERA
Micropterix aruncella Scopoli
Golden, mandibulate moth found in the flowers in small numbers at a dozen sites between 7 June and 6 July with one record on 27 July (see Heath 1959).

Mompha miscella (Denis & Schiff.)
Larvae flesh coloured or pinkish with white mottling. They mine the leaf and may enter a second leaf if the first is too small. Empty mines can be identified by the scattered, cuboid frass occurring in small clusters. First generation larvae were found from early April to early June, the earliest producing adults at the beginning of May. A second generation, from the end of June to about 16 August produced adults between 20 July and end of August; a few larvae were also found feeding on seeds within the capsules in the latter half of July. Mines of a third generation were occasionally found in November. A very widespread and locally common species.

Teleoides sequax (Haworth)
Larvae pinkish green when full grown, feeding initially in leaves spun together, and later in the flowers with the petals folded down. Pupae were formed from 6 June to 4 July and produced adults between the beginning and end of July. Only definitely found at five sites but this and the following four species were difficult to distinguish because of variations in colouring between instars and individuals so all identifications were based on adults bred out.

Cnephasia interjectana (Haworth)
Larvae pale yellow, greyish, greenish or brown with shiny brown or conspicuous black spots (pinacula) and pale brown head. After over-wintering, the young larvae mine the leaves initially but later feed on leaves or petals spun together. Such spun leaves were seen from the first half of May, and larvae collected between 25 May and 5 July produced

adults between 18 June and 27 July. This polyphagous species was much the most common of the tortricids on *Helianthemum*, occurring at almost all sites.

Cnephasia longana (Haworth)
Pale greenish brown larvae with pale head and a pair of conspicuous, pale, subdorsal lines in late instars. Habits like the last species. Larvae collected between 7 June and end of July produced adults from 11 July to 18 August. At most sites.

Acleris aspersana (Hubner)
Larvae whitish green to greenish brown without spots or lines. Feeding in spun leaves. Only two adults bred out about 20 July from larvae collected in the last week of May.

Acleris comariana (Lienig & Zeller)
Larvae as above. One specimen found in the spun leaves of cultivated *Helianthemum* in a garden at Barnack on 20 June. It pupated about 7 July and produced an adult on 26 July. The species is said to feed on *Potentilla*, *Geum* and *Fragaria* and may have come off other plants in the garden.

Olethreutes lacunana (Denis & Schiff.)
Larvae usually dark chocolate brown feeding in spun leaves after hibernation. Those collected 23 May to 6 June produced adults from the middle of June to the middle of July. Polyphagous but uncommon on rock-rose.

Agrochola litura (L.) and *Pyrrhia umbra* (Hufnagel) Noctuidae
One larva of each was found feeding on *H. chamaecistus* on 20 June and 11 September becoming adult on 9 September and 10 May respectively.

Aricia agestis (Denis & Schiff.)
Brown argus butterflies were recorded at Barnack in small numbers during most years by the warden but were never found as larvae during this study.

COLEOPTERA
Aphthona herbigrada (Curtis)
Larval root feeder on *H. chamaecistus*. Earliest records of adults were on 17 July but very large numbers of teneral adults were collected at the end of July and large numbers continued until the end of regular sampling in mid September. Only present on about a third of the sites sampled and most abundant at three sites in or on the edge of quarries where the vegetation was sparse.

Mantura matthewsi (Curtis)
Larval leaf miner distinguished, even within the leaf, from *Mompha miscella* by its yellow colour and black spots. It also can enter a second leaf which therefore does not show the typical mine (Hering 1957). Empty mines are recognised by the vermiform or amorphous frass, often concentrated along the middle of the mine. One generation with larvae from the beginning of May until about 20 June and adults between 8 June and mid August. Pupal period lasting 2–3 weeks. Crowson (1967) suggests that *H. polifolium* (= *appeninum*) is an unacceptable food plant for this insect from observations at Brean Down, Somerset. However, its absence from several apparently suitable *H. chamaecistus* sites in the Stamford area, and its successful introduction at two sites, shows that this point needs confirmation.

Altica pusilla Duftschmid
This greenish blue fleabeetle (2.8–3.8 mm) is associated with *Helianthemum* according to Kevan (1962) but it seems likely that it is more closely associated with *Sanguisorba minor*

(M. G. Morris *pers. comm.*) and, on the Continent, with *S. officinalis* (Mohr 1966). Both plants occur at Barnack where the insect was collected in suction samples each week between 25 July and 12 September with a peak in mid August, and single individuals in mid May and mid June after overwintering. The larva is undescribed.

Bruchidius cisti (F.)
Fabricius noted the association of the adult with the flowers of *Helianthemum* in 1781 and this was widely accepted as the foodplant until Southgate (1979) bred the species from the pods of *Lotus corniculatus*. The adults are distinguished from *B. ater* by their elongate, conical pronotum and the long antennae which extend beyond the base of the pronotum. It is a rather local species recorded from South Hampshire and Kent to Yorkshire (VC 62) (Cox *pers. comm.*). It was commonly seen in rock-rose flowers at about half of the sites in the Stamford area throughout June, with sporadic records up to the beginning of September.

Meligethes solidus (Kugelann)
This relatively large and broad flower beetle was easily recognised by the broad front tibia bearing a few very large teeth. It occurred in the flowers, sometimes between the petals and sepals, from 15 May to the beginning of July with a peak about mid June and again from the last week of July into September. Present on almost all the larger sites.

Meligethes aeneus (F.)
This very common and polyphagous species was recognised by the metallic blue-green colour and narrow tibia with scarcely visible teeth. It was recorded on nearly every site between early June and the end of July when large numbers of teneral adults appeared.

Several other *Meligethes* species were found in small numbers.

Phyllobius roberetanus Gredler and *P. viridiaeris* (Laicharting)
Both seen feeding on the petals and found during June and July at most sites. Both are highly polyphagous.

Several other beetles were found more or less regularly in the flowers of rock-rose, presumably feeding on nectar. The most common of these was *Isomira murina* (L.) at 12 sites from 20 May to 5 July. Others were *Oedemera lurida* (Marsham), *Malachius viridis* (F.), *M. bipustulatus* (L.) and *Miarus campanulae* (L.) where its larval host plant *Campanula rotundifolia* occurred.

THYSANOPTERA
Haplothrips helianthemi Oettingen
First British records. This tubuliferan thrips is very similar to *H. jasionis* Priesner. Adults were found in the flowers at five sites during June and July, and larvae emerged from capsules collected during August.

The predatory *Aeolothrips tenuicornis* Bagnall was also recorded at these sites.

DIPTERA
Contarinia helianthemi (Hardy)
The terminal bud galls of this species were readily seen and recognised by their swollen appearance and development of white hairs. They were recorded at ten sites from the middle of July to the middle of September but these later galls were usually empty. No adults were successfully bred from them. Niblett (1952) recorded that the larvae left the gall to pupate; those collected in mid August produced adults in September and the following June.

Larvae of *Dasineura* sp. were found in the *Contarinia* galls at three sites and one female was bred out. These were probably inquilines (Harris *pers. comm.*).

Clinodiplosis sp.
Larvae were found in the seed capsules at several sites. They were probably mycophagous. A single *Lestodiplosis* sp. was also bred from capsules.

ACARINA
Two species of oribatid mites, *Trichoribates trimaculatus* (C.L.K.) and *T. incisellus* (Kram.) together with nymphs of one or both species were collected from *H. chamaecistus* capsules at two sites.

PARASITOIDS
Representatives of three families of Hymenoptera were reared from Lepidoptera larvae and, in one or two cases, from *Mantura matthewsi* (Table 1).

TABLE 1
Parasitoids from insects feeding on *Helianthemum chamaecistus*

Species/ FAMILY	Host	Host collected	Parasitoid emerged
EULOPHIDAE			
Necremnus tidius (Walker)	*Mompha*	17.4.78	30.4.78
N. folia (Walker)	*Mantura*	6.6.79	13.9.79
ICHNEUMONIDAE			
Diadegma sp.A/sp.B	*Cnephasia*	28.6.78/20.6.79	13.7.78/8.7.79
Diadegma sp.C	*Mompha*	10.8.78	*ca* 25.8.78
Trieces sp.	*Cnephasia*	18.6.79	20.7.79
Compoplex sp.	*Cnephasia*	25.7.78	9.8.79
BRACONIDAE			
Macrocentrus near *thoracicus* (Nees)	*Cnephasia*	10.7.79	17.7.79
Orgilus sp.	?*Mompha*/*Mantura*	4.5.78	21.5.78
Chelonus sp.	*Mompha*	25.7.78	*ca* 25.8.78
Apanteles sp.	*Mompha*	7.8.78/17.7.79	25.8.78/13.8.79
Apanteles sp.	*Cnephasia*	24.5.79	27.6.79

ACKNOWLEDGEMENTS
I wish to thank Mr P. E. Jones for help in sampling the fauna and in the major task of trying to rear more than 300 larvae. I am grateful for the identification of material to J.

Heath (Lepidoptera), Dr H. L. G. Stroyan (aphids), Dr B. J. Southgate (*Bruchidius*), K. M. Harris (Diptera), Mrs J. Palmer and Dr zur Strassen (thrips), T. Huddleston, Dr Z. Boucek and Dr I. D. Gould (Hymenoptera).

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SMALL MAMMALS AT FILEY

J. WHITEHEAD and C. SHARP

On 17 August 1985, the Filey Brig Ornithological Group and the Yorkshire Mammal Group held a 24 hour mammal trap at Filey. The site, called 'The Dams' (grid ref. TA 110814), at the edge of Filey estates and bordered by houses as well as by pasture and wheat fields, is intended to be a nature reserve.

The area surveyed is shown in Fig. 1; traps were laid in pairs at various sites so that the different types of habitat present were all represented. Although The Dams is a small area of only 10 acres, it includes streams, boggy ground, dry ground and woodland; all of these were sampled.

Fifty Longworth traps were prebaited with rolled oats and maize at 3 p.m. on 13 August. On 16 August, more rolled oats and maize and some pupae as shrew bait were added, and the traps were set. They were examined at 9 a.m., 1 p.m., and 6 p.m. on 17 August.

38 captures were made and a wide variety of small mammals were present. Perhaps the range of species was linked with the wide range of habitats available. The distribution of each species was as follows:

Only one woodmouse (*Apodemus sylvaticus*) was caught, in trap 42. It was not in breeding condition. Subsequently a woodmouse nest has been found in the hedgerow there.

Bank voles (*Clethrionomys glareolus*) occurred along the woodland edge (traps 1–16) and in the hedgerow (traps 41–50). Most bank voles were in breeding condition, and juveniles weighing 9 g and 15 g were caught.

Field voles (*Microtus agrestis*) were trapped in tall grasses by the stream: an unusual habitat for these animals. Half the adults caught were in breeding condition, and again a juvenile weighing 9 g was caught.

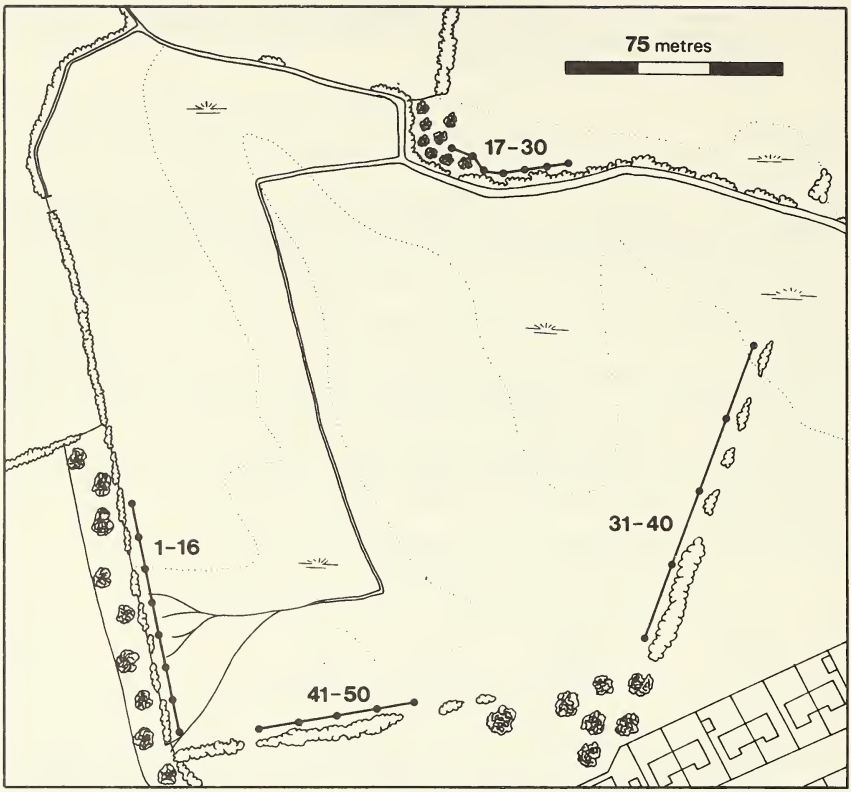

FIGURE 1
'The Dams', Filey: location of mammal traps (see text).

Water shrews (*Neomys fodiens*) were trapped in three areas: the hedgerow, the woodland edge and by the stream (traps 17–30). They were slightly heavier than the common shrew, with an average weight of 11.2 g compared with 8.2 g. They were very dark in colour with white undersides, often with a broad dark streak down the middle. We actually put one into water and watched it swimming — an unforgettable sight. Its coat looked silver-grey because of trapped air bubbles and it made several graceful dives.

Common shrews (*Sorex araneus*) also occurred in the wet ground next to the woodland, and next to the stream.

No animals were trapped in the drier ground (traps 31–40). This was less sheltered and nearer to the houses: however, longer trapping would have probably revealed some small mammal activity there too.

In summary, five small mammal species were present in this small area, of which the water shrew was the most remarkable. The long grass by the stream was searched for harvest mouse (*Micromys minutus*) nests, to no avail. The area is of outstanding interest in terms of its natural history for several reasons: in particular, the amphibian fauna and the variety of birds present are both remarkable. The water shrew can now be added to this list as a highly unusual and interesting addition. It is to be hoped that the site will form a proper nature reserve, and that further building developments will not affect it adversely.

A NEW SPECIES OF *POECILOCHIRUS* (ACARI: PARASITIDAE) FROM YORKSHIRE

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Species of *Poecilochirus* G. and R. Canestrini, 1882, have been recorded widely from Europe and Asia and are found generally in the deutonymphal (third postembryonic) stage associated with burying beetles of the family Silphidae, especially the genus *Nicrophorus*. There are few published records of *Poecilochirus* from North America, although *Nicrophorus* is widely distributed in the region.

The largest number of *Poecilochirus* recorded from a single beetle is 1,486 deutonymphs of *P. carabi* G. and R. Canestrini and 107 deutonymphs of *P. subterraneus* (Müller) 'sharing' an exhausted *Nicrophorus humator* (Gleditsch) with 11 *Macrocheles glaber* (Müller) and three *Alliphis halleri* (G. and R. Canestrini) when it was collected at Launceston, Cornwall on 26 July 1974 by Mr L. H. J. Williams (Hyatt 1980). Occasionally, *Poecilochirus* deutonymphs may be collected in soil, litter and moss samples, but this is due possibly to their becoming detached from a beetle, either during moulting, or as a consequence of overcrowding. Milne and Milne (1982) believe the relationship between the beetles and the mites confers mutual benefits. They describe how the mites feed largely on the contents of eggs laid by flies on the corpses buried by the beetles, thus preventing the fly larvae from competing with the beetle larvae for the food supply. However, Christie (1981), in her detailed study of the mites associated with British burying beetles, noted that *Poecilochirus carabi* could breed on corpses in the absence of *Nicrophorus* spp. both in the field and in the laboratory, and concluded that the relationship was purely phoretic.

The Genus *Poecilochirus*

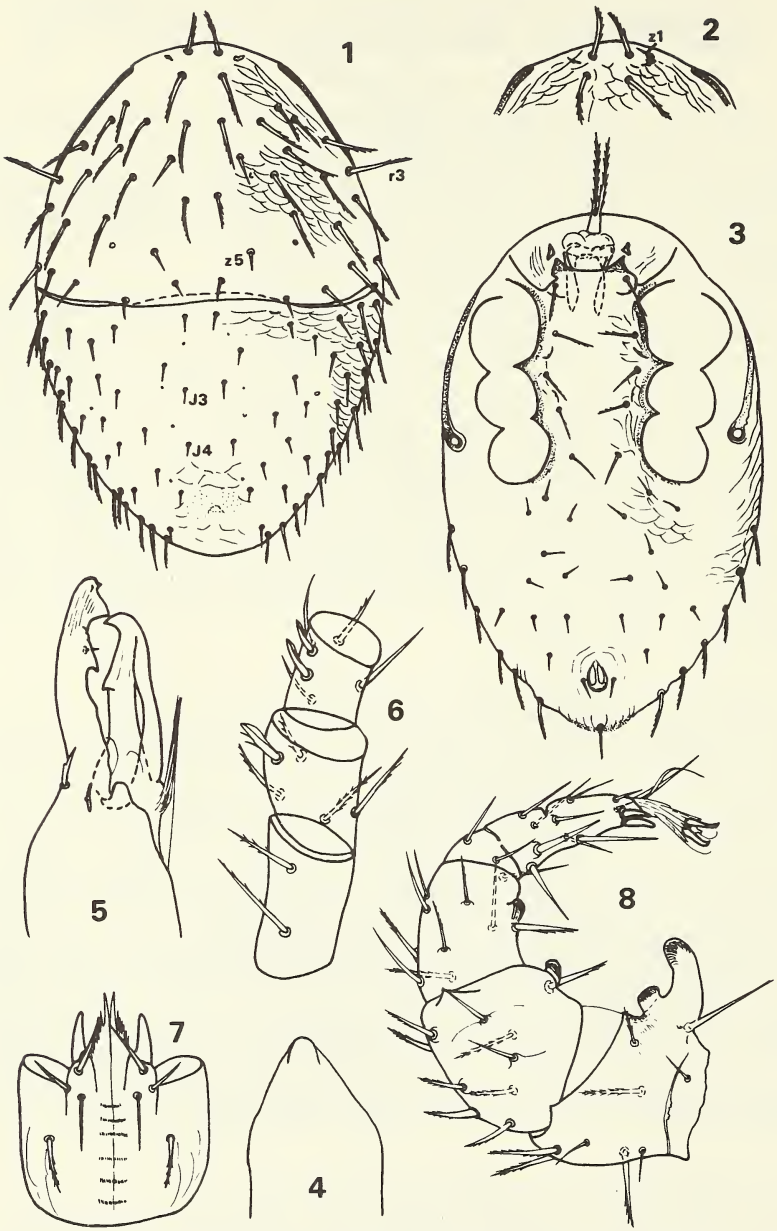
Hyatt (1980) recorded four species of *Poecilochirus* from the British Isles — *P. carabi* G. and R. Canestrini, 1882 (the type species), almost exclusively from *Nicrophorus* beetles, but a small number from other beetles and from small mammals; *P. austroasiaticus* Vitzthum, 1930, from maggots used as anglers' bait and from a glue factory, and a few from beetles (including *Nicrophorus*); *P. davydovae* Hyatt, 1980, from silphid beetles, *Nicrophorus* and *Thanatophilus*; and *P. subterraneus* (Müller, 1860), almost exclusively from *Nicrophorus*, but also from another silphid, *Oiceoptoma*, and from a scarabaeid, *Aphodius*. Of these, *carabi*, *austroasiaticus* and *davydovae* are known from both immatures and adults, whilst *subterraneus*, which was previously known only from the deutonymph, is now known also from the male (Christie 1983).

Two further species, *P. macgillavryi* Oudemans, 1927 (from Holland) and *P. trebinjensis* Willmann, 1940 (from southern Jugoslavia) are known only from the deutonymph and are possibly synonymous with *P. carabi*.

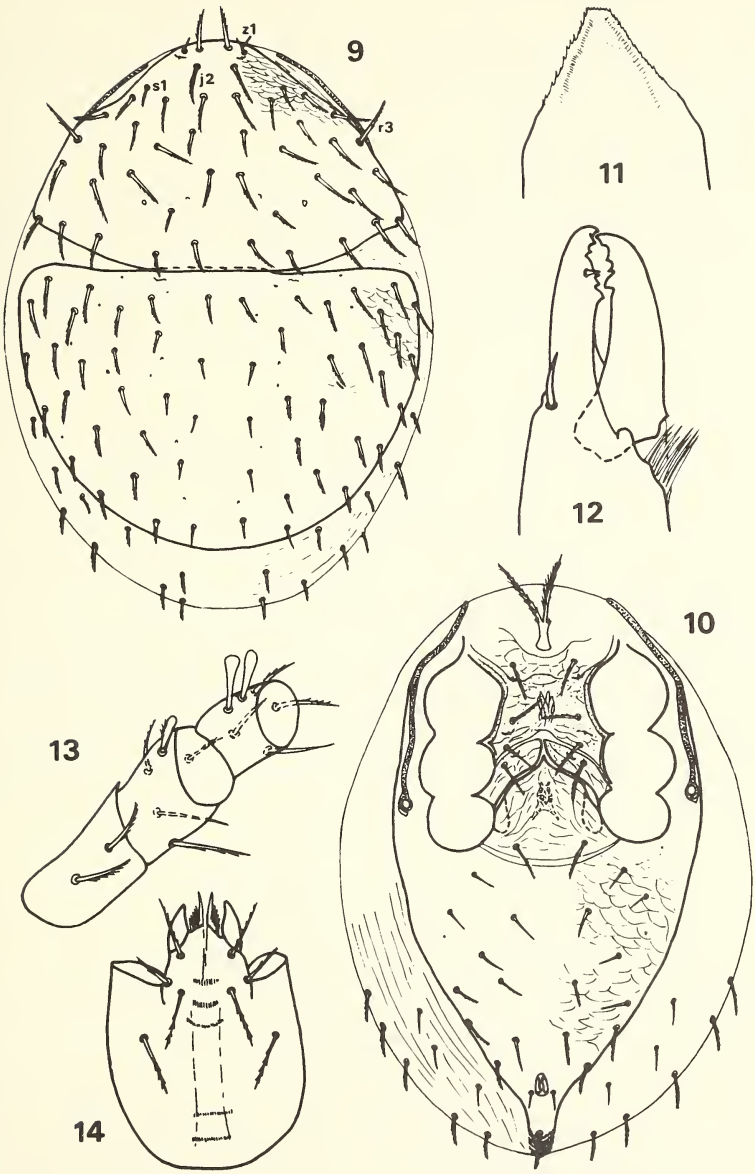
Early in 1983 Mr W. A. Ely, Keeper of Natural History at Clifton Park Museum, Rotherham, sent for identification a small collection of mites and ticks among which were five specimens (2♂♂, 3♀♀) of an undescribed *Poecilochirus* species from a nest of the widespread and common social tree-wasp *Dolichovespula silvestris* (Scopoli) found in a bird nest-box.

Poecilochirus britannicus sp. nov.

MALE. Idiosoma entirely reticulated, 980 μm long × 615 μm wide in one specimen and 1,100 μm long × 650 μm wide in the second specimen, and divided dorsally by a median transverse suture (Fig. 1). Podonotal region bearing 22 pairs of setae in the figured specimen which has setae *z1* undeveloped. In the second specimen right *z1* only is present (Fig. 2). Most setae pectinate distally on one margin. The longest, *r3*, 120–125 μm.



FIGURES 1–8: *Poecilochirus britannicus* sp. nov., **male**, 1, dorsum; 2, vertex of dorsum of second specimen; 3, venter; 4, tectum; 5, chelicera; 6, palp trochanter, femur and genu; 7, venter of gnathosoma; 8, leg II.



FIGURES 9–14: *Poecilochirus britannicus* sp. nov., **female**, 9, dorsum; 10, venter; 11, tectum; 12, chelicera; 13, palp trochanter, femur and genu; 14, venter of gnathosoma.

Opisthonotal region with approximately 35 pairs of setae, only those around the margin being partly pectinate; remainder very short (*J3* are *c.* 25 μm and *J4* are *c.* 22 μm) and slender.

Tritosternum with short, narrow base and paired pilose laciniae (Fig. 3). Ventral region covered by a reticulated holoventral shield. Sternal setae the longest, most showing traces of pectination along one margin. Opisthogastric setae fine, slender; postanal seta almost three times the length of the two paranal setae. Peritreme finely granular, extending anteriorly to the level of coxa I.

Tectum (Fig. 4) comprising a broad rounded eminence with smooth margins and granular surface. Chelicera as in figure 5; movable digit *c.* 95 μm in length and bearing one large tooth medially; fixed digit with a slightly elongate rounded tip and also bearing a single large tooth medially. Chaetotaxy of the palp trochanter, femur and genu as in figure 6; anterolateral seta on the femur broad and pectinate on one margin, the two anterolateral setae on the genu spatulate and without pectinations. Venter of gnathosoma as in figure 7; corniculi strong and conical, anterior hypostomatic setae the stoutest, internal posterior setae the slenderest, palpcoxal setae finely pilose; only about six rows of hypognathal denticles visible. Many of the leg setae stout and finely pilose, generally along one margin; leg II as in figure 8.

FEMALE. Dorsal shields well sclerotized and entirely reticulated (Fig. 9). Podonotal shield 550 μm long × 840 μm wide in the figured specimen — the holotype — and 550 and 600 μm long × 850 and 840 μm wide in the other two specimens respectively; with 23 pairs of stout setae, the majority with the tips at least finely pilose or squarrose. Among the longest setae are *j2* and *r3*, measuring up to 120 μm, while *z1* (*c.* 33 μm) and *s1* (*c.* 55 μm) are the shortest. Opisthonotal shield 650 μm long × 910 μm wide in the holotype and 600 μm long × 920 μm wide in one of the other specimens. In the third specimen this shield is damaged. It bears 26–27 pairs of setae similar in form to those of the podonotal shield, but all are generally shorter — the longest *c.* 103 μm.

Tritosternum with narrow base and pilose laciniae. No trace of presternal shields (Fig. 10). Sternal shield weakly sclerotized anteriorly, entirely reticulated, metasternal and genital shields well sclerotized and reticulated. Sternal and metasternal setae of even length (*c.* 86 μm), genital setae shorter (*c.* 68 μm), all pilose on one margin. Genital shield pointed anteriorly, convex on lateral margins. Opisthogastric shield reticulated, tapering strongly immediately posterior to the anus. The nine pairs of opisthogastric setae slender, most showing signs of pilosity on one margin. The paired paranal setae short (*c.* 33 μm), slender, postanal seta (*c.* 65 μm) stout, similar to the main dorsal setae. Peritreme finely granular, extending anteriorly to the level of coxa I.

Tectum as in figure 11; similar in outline to that of the male, but margin finely denticulate anteriorly. Chelicera as in figure 12; fixed digit with five teeth, one broad tooth and two pairs of small teeth; movable digit 85 μm, with one large tooth and two small teeth. Chaetotaxy of palp trochanter, femur and genu as in figure 13. As in the male, anterolateral seta on femur broad, pectinate on one margin; the two anterolateral setae on genu spatulate, without pectinations. Venter of gnathosoma as in figure 14; relative lengths of hypostomatic and palpcoxal setae as in the male, but, unlike the male, all setae pilose to a degree; only about five rows of hypognathal denticles visible. Majority of leg setae stout and pilose on one margin, none conspicuously long.

MATERIAL. The holotype female (BMNH reg. no. 1985.5.15.1), two paratype females (1985.5.15.2–3) and two paratype males (1985.5.15.4–5) collected by Mr A. J. Bickerstaffe from the nest of *Dolichovespula silvestris* (Scopoli) (Hymenoptera) in a bird nest-box, Moorgate Road, Rotherham, S. Yorkshire, 1 August 1982.

This species is intermediate in size between *P. carabi* (the largest species of the genus) and *P. austroasiaticus*. In the male of *P. britannicus* the dorsal chaetotaxy differs conspicuously from those species in that the setae are generally much shorter. The longest setae, *r3*, measure *c.* 240 μm in *carabi* and *c.* 200 μm in *austroasiaticus*, whereas in *britannicus r3* measure only *c.* 125 μm. In *carabi* setae *z5* measure *c.* 180 μm, in *austroasiaticus c.* 160 μm, but in *britannicus* only *c.* 40 μm. In the female of *P. britannicus*

the dorsal setae are again shorter than in either *carabi* or *austroasiaticus* with *r3* measuring *c.* 120 μm against *c.* 190 μm in the former and *c.* 200 μm in the latter. Like *carabi*, the new species lacks the dark central portion to the sternal shield which is conspicuous in *austroasiaticus*, but unlike *carabi* the opisthogastric shield in *britannicus* is strongly tapered.

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ENTOMOLOGICAL REPORTS FOR 1983–1984
HEMIPTERA

S. FOSTER

A national recording scheme for the Heteroptera was launched in 1984 by the Biological Records Centre. Yorkshire records will continue to be maintained, but as regional co-ordinator for the national scheme I will forward all records to the scheme organisers. A distribution and habitat data-base is being constructed and it is hoped that members of the Entomological Section will pass on records of all species to me, not just those considered to be of local or special interest.

I wish to express my thanks to Mr J. H. Flint who kindly prepared the Homoptera-Auchenorhyncha records listed below, and to all those who have submitted records of Heteroptera. In each list, names of contributors are given the first time each occur and thereafter initials are used.

† New County Records; * New Vice County Records.

Heteroptera

Aneurus avenius (Dufour, 1833) (†64) High Batts Nature Reserve, under *Alnus* bark, 30/12/82; J. H. Flint.

Dolycoris baccarum (Linnaeus, 1758) (†63) Hatfield Moor, 29/9/80; B. Eversham.

Heterogaster urticae (Fabricius, 1775) (†63) Rossington Bridge, 16/9/84; P. Skidmore.

Ischnodemus sabuleti (Fallén, 1826) (63) Ogden Reservoir, 9/7/83; J.H.F. A notable extension to the Northern limit of this insect in Yorkshire.

Scolopostethus puberulus (Horvath, 1887) (†63) Rushy Moor in fen litter, 9/3/83; S. Foster.

Xylocoris cursitans (Fallén, 1807) (*62) Duncombe Park, under *Fagus* bark, 18/6/83; S.F.

Loricula elegantula (Bärrensprung, 1853) (*64) East Wood Otley, 13/7/84; R. Crossley.

Alleotomus gothicus (Fallén, 1807) (†63) Sandall Beat, on *Pinus sylvestris*, 3/9/80; P.S.

Tytthus pygmaeus (Zetterstedt, 1840) (*63) Inkle Moor in fen litter, 31/7/83; S.F.

Chlamydatus pulicarius (Fallén, 1807) (†63) Doncaster Racecourse, 9/6/82; S.F.

Macroloplus rubi (Woodroffe, 1957) (†63) Sandall Beat, on *Rubus* growing in shaded woodland 22/8/84; S.F.

Orthotylus nassatus (Fabricius, 1787) (*63) Hatfield Lings, on *Tilia*, 31/7/83; S.F.
O. diaphanus (Kirschbaum, 1855) (*63) Sprotbrough, on *Salix alba*, 13/8/83; S.F.
Pseudoloxops coccineus (Meyer-Dür, 1843) (†63) Cusworth Hall, on *Fraxinus* in August and September, 6/9/84; S.F.
Cryptostemma alienum (Herrich-Schaeffer, 1835) (*62) Duncombe Park, 18/6/83; S.F.
Ceratocombus coleoptrata (Zetterstedt, 1819) (*63) Thorne Moor, in pitfall trap, 17/11/82; M. Limbert.
Mesovelia furcata (Mulsant and Rey, 1852) (†63) Cantley Park, on *Potamogeton*, 4/9/83; S.F.
Cymatia bansdorfi (Sahlberg C., 1819) (*63) Cantley, 4/9/83; (63) Fishlake, 28/9/84; S.F.
Glaenocorisa propinqua (Fieber, 1860) (*65) Birkdale Tarn, 5/10/84; J.H.F.
Arctocorisa germari (Fieber, 1848) (*65) Birkdale Tarn, 5/10/84; J.H.F.
Subsigara scotti (Fieber, 1868) (*63) Thorne Moor, 31/7/83; Cantley Park, 7/9/83; S.F.
Vermicorixa lateralis (Leach, 1817) (*63) Cantley, 7/9/83; Wentworth, 15/4/84; S.F.

HOMOPTERA – AUCHENORHYNCHA

Aphrophora alpina Melichar, 1900 (*63) Rushy Moor Askern, in profusion in open fen, 14/7–10/8/82; P.S.
A. salicina (Goeze, 1778) (*63) Rushy Moor, a few in open fen, 10/8/82, 20/7/83; P.S.
Oncopsis carpini (J. Sahlberg, 1871) (†63) Red House Plantation, Sandall Beat, on *Carpinus*, 10/6/81; P.S.
Macropsis fuscinervis (Boheman, 1845) (†61) Allerthorpe Common, on *Populus tremula*, 8/7/79; J.H.F.
Aphrodes histrionicus (Fabricius, 1794) (*62) Bridestones Nature Reserve, 8/8/82; J.H.F.
Paramesus obtusifrons (Stål, 1853) (†61) Cherry Cob Sands, 14/9/83; J.H.F.
Cosmotettix panzeri (Flor, 1861) (†62) Bridestones Nature Reserve, 8/8/82; J.H.F.
Adarrus multinotatus (Boheman, 1847) (*63) Brancliffe limeworks, 5/7/79; W. A. Ely.
Allygus commutatus (Fieber, 1872) (†63) Rushy Moor Wood, 1/7/82; P.S.
Grypotes puncticollis (Herrich-Schaeffer, 1834) (*63) Sandall Beat, on *Pinus sylvestris*; 3/9/80; P.S. (*64) High Batts Nature Reserve, North Stainley, 14/8/83; J.H.F.
Macrosteles viridigriseus (Edwards, 1924) (*62) Bridestones Nature Reserve, 8/8/82; J.H.F.
Empoasca decipiens Paoli, 1930 (*63) Crow Wood, Finningley, 24/4/83; J. T. Burn. (*64) Fountains Abbey, 15/9/84; J.H.F.
Kybos calyculus (Cerutti, 1939) (†63) Barnby Dun Station Wood, 16/7/78; P.S.
K. virgator (Ribaut, 1933) (*63) Askern, 6/7/76; P.S.
Eupteryx thoulessi Edwards, 1926 (†63) Rushy Moor, on open fen, 14/7/82; P.S.
E. vittata (Linnaeus, 1758) (*63) Sandall Beat, 3/7/80; P.S. (*63) Knottingley Willow Garth, 1/6/81; J.H.F.
Linnavuoriana decempunctata (Fallén, 1806) (*63) Sandall Beat, 17/4/83; J. T. Burn.
Edwardsiana hippocastani (Edwards, 1888) (*63) Sandall Beat, 5/7/74; P.S. (63) Doncaster Museum, one at light, 14/7/74; P.S.
E. salicicola (Edwards, 1885) (*63) Whitgift, at light, 6/76; A. Grieve. (63) Bentley Common, 23/9/76; P.S.
Zyginidia scutellaris (Herrich-Schaeffer, 1838) (*64) Bishop Wood, in damp, shady rides, 29/9/84; J.H.F.
Stenocranus major (Kirschbaum, 1868) (†61) Wheldrake Ings Nature Reserve, commonly on *Phalaris*, 15/9/83; J.H.F.
Chloriona dordorsata Edwards, 1898 (*63) Bentley colliery tip, 16/7/80; P.S.
C. unicolor (Herrich-Schaeffer, 1835) (*61) Spurn, canal zone, 10/6/84; J.H.F. (*63) Bentley colliery tip, 16/7/80; P.S. On *Phragmites*.
Tyrphodelphax distinctus (Flor, 1861) (*62) Fen Bog, 10/7/83; J.H.F.

JUNCUS AMBIGUUS GUSS. (*J. RANARIUS* SONG. & PERR.) IN YORKSHIRE

E. CRACKLES

Cope and Stace (1978) surveyed the history of the taxonomic treatment of the *Juncus bufonius* L. aggregate; within it they recognised five species as occurring in western Europe, three of them in the British Isles. Of these the extremely variable *J. bufonius* L. is the common species, occurring in a variety of habitats including brackish marshes, whilst both *J. foliosus* Desf. and *J. ambiguus* Guss. have a restricted distribution in Britain. *J. foliosus* occurs only in freshwater habitats, mainly in the south-west, whilst *J. ambiguus* is a halophyte occurring on sand and mud flats above high water.

Snogerup (1980) on the other hand recognised six species as occurring in western Europe, citing four of these for Britain, including *J. minutulus* Alb. & Jah. in addition to the species mentioned above; he also rejected the name *J. ambiguus* in favour of *J. ranarius*. Cope and Stace (1983) reviewed the characters used in the delimitation of segregates of the *Juncus bufonius* aggregate and the variation within the segregates. They do not separate *J. minutulus* taxonomically, preferring to retain it within *J. bufonius sensu stricto* 'at least until this polymorphic taxon has been examined in detail across a wide area of its range'. Cytological studies by Cope and Stace (1985) reveal that *J. foliosus* and *J. ambiguus* are near diploids, whilst *J. bufonius sensu stricto* (including *J. minutulus*) is a polyploid complex. The same authors (1978) had earlier expressed the view that *J. ambiguus* and *J. ranarius* are conspecific.

Prior to 1978, I had recorded finding Toad Rushes on bare ground on the northern part of Spurn, in an area lost by erosion, and by the canal behind the Humber bank at Skeffling in an area now overgrown. There seemed a strong possibility that these plants were *J. ambiguus*.

On 10 August 1985, I paid a visit to Spurn with other botanists and expressed an interest in examining any *J. bufonius* agg. plants seen. Martin Nicholls found such plants in three separate localities: 1. in an open situation on the sandy gravelly coastal belt immediately north of Kilnsea Warren where *Parapholis strigosa* also occurs, 2. in a generally grassy area between Kilnsea Beacon Lane and the sea, and 3. on bare sand near Kilnsea Beacon Lane Pond in an area where *Juncus gerardii* is generally frequent.

On 1 September 1985, Eric Chicken, who was aware of the Kilnsea discoveries, found *J. ambiguus* at Barmston on sand on the seaward side of a dried out lagoon.

Cope and Stace (1978) recorded *J. ambiguus* for 34 vice-counties in Britain, and there have been subsequent records for six more vice-counties published in *Watsonia*. As far as I can ascertain, the taxon has not been found in Yorkshire previously, but it could be at additional sites to those given above on the Yorkshire coast and in brackish marshes by the R. Humber.

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FILM REVIEW

On the Verge of Life, written and produced by **Patrick Uden**. London: Uden Associates for Ford Motor Company, 1985. 16 mm film (also available as video-tape). Duration: 50 minutes.

To make this film practically the whole of the English motorway system has been explored. In the north of England, perhaps one of the most interesting features shown is Tebay Lake, a large pool created by a loop formed by a slipway connecting with the main carriageway. It has plentiful marginal vegetation, a fauna including aquatic insects and tadpoles 'in season', and it is visited by mallard, moorhen and yellow wagtails. In contrast, under the so-called 'spaghetti junction' on the M6, a length of disused canal appears to be devoid of life. In fact, sticklebacks live there, and we are shown their whole life cycle.

Cameraman Alastair Macewen of London Scientific Films, one of the specialist photographers for 'On the Verge of Life', shooting a wild poppy under one of the large junction signposts on the M25.

Most of the film, however, deals with the motorway verge proper. We see an abundance of wild flowers — such as foxgloves and poppies, primroses and orchids; and many kinds of animals — voles and mice, hedgehogs and weasels, for instance. Not many people are allowed on the verges, but one authorized person, Gordon Post of Newcastle University, gives us a glimpse of his researches on the insects that live there. He has found that oxides of nitrogen from vehicle exhausts increase the nitrogen content of plants immediately adjacent to the road and thus increase also the breeding rates of the insects that feed on them. It becomes clear as the story of the wildlife on their verges unfolds that the motorways have an important part to play in conservation as linear nature reserves. The film is entertaining without being facetious, but it is essentially a serious study of an interesting ecological phenomenon. It may be hired from Guild Sound and Vision, 6 Royce Road, Peterborough, PE1 5YB.

FHB

ENTOMOLOGICAL REPORTS FOR 1973–1983
COLEOPTERA: PART 2, HALIPLIDAE — SCOLYTIDAE

J. H. FLINT

This part follows Part 1 (1984, *Naturalist* **109**:116–120) and continues and completes the Coleoptera Report, 1973–83 with the exception of the sub-family Aleocharinae which will appear later.

During the period very considerable activity has been widely spread across the county and a formidably large number of records have been received from which those below have been selected. Although some of the species are now recorded in Yorkshire for the first time following revisions of critical groups and painstaking collection and examination of very small, inconspicuous beetles, e.g., *Acrotrichis*, many others are distinctive and noticeable species that no coleopterist would pass by unremarked and unreported. It is intriguing to speculate on the possibility of some 'southern' species extending their range northwards in the way that the pine ladybird *Harmonia quadripunctata* did but such northward extension is counter-balanced by the apparent southward extension of range of some 'northern' species, as *Glischrochilus quadripunctatus* and *Magdalis phlegmatica*. Some records result from careful searching of especially interesting habitats to which access has been generously granted by local landowners and we are grateful for this generosity. An outstanding example is the old woodland of Duncombe Park at Helmsley. Yet others are the result of chance finds of beetles that are rarely seen because their habits keep them concealed and unusually difficult of discovery: *Chrysolina marginata* is one of these.

My thanks go to all the contributors of records and especially to Mr K. G. Payne, who sorted and entered all the weevils (Rhynchophora) on to the record sheets, and to Mr M. L. Denton who has accepted the task of entering the records and preparing a report on the rove beetles of the Aleocharinae. Initials used in the list that follows are those of E. W. Aubrook, R. G. Booth, J. T. Burns, R. Crossley, M. L. Denton, W. A. Ely, J. H. Flint, S. Foster, F. A. Hunter, C. Johnson, P. Kendall, R. S. Key, R. J. Marsh, K. G. Payne, P. Skidmore.

Haliplus heydeni Wehn. (64) Knaresborough Ringing Station, 10/7/82; M.L.D. 21/5/83; J.H.F.

Guignotus pusillus (F.) (64) Leeds University cooling pool, in abundance 26/4/74 but not found there in 1982 and 1983; J.H.F. The only recent record.

Coelambus parallelogrammus (Ahr.) (61) Skipwith Common, 25/4/82; J.H.F. The only inland Yorkshire record of this normally estuarine beetle.

Graptodytes bilineatus (Stm.) (61) Holme upon Spalding Moor, Hasholme Farm old marl pit, 5/7/82; K.G.P. Only previously known in the North of England at Cherry Cob Sands.

Agabus congener (Thunb.) (*62) Strensall Common, 18/6/66; K.G.P.

Gyrinus minutus F. (63) Bretton Park, 20/6/82; M.L.D. (*teste* E.W.A.). The only record in this century.

Helophorus tuberculatus Gyll. (62) Blue Wath Beck side, above Rosedale, 11/8/79; K.G.P. The first of several recent reports from the North York Moors; it appears now to be firmly established.

Laccobius atratus (Rott.) (*61) Kilnsea, 21/8/82; J.H.F. Osmotherley the only other.

Paromalus flavicornis (Hbst.) (62) Duncombe Park, Helmsley, 12/10/80; J.H.F.

Paralister purpurascens (Hbst.) (*63) Blaxton sand pit, 22/6/77; J.T.B. Eggborough, 21/6/83; R.J.M.

‡ New British records. † New county records. * New vice-county records.

†*Ptinella cavelli* (Broun) (63) Netherton, 4/12/83; M.L.D. Det. C.J. who reports that this introduction from New Zealand is now not uncommon in the north.

†*Acrotrichis cognata* (Matth.) (61) Skipwith Common, 23/8/80; R.S.K. (64) Bishop Wood, 2/9/80; R.J.M. (*teste* C.J.).

A. henrici (Matth.) (63) Rushy Moor, 19/7/83; R.J.M. (*teste* C.J.).

A. insularis (Mäkl.) (*61) Newbald Marsh, 9/8/80; R.S.K. (*62) Langdale Rigg, 20/10/79; Ravenscar, 12/5/80; R.S.K.

†*A. silvatica* Rossk. (61) Skipwith Common, 23/8/80; R.S.K.

Leptinus testaceus Muell. (64) Knaresborough Ringing Station, in woodmouse nest, 11/7/82; M.L.D.

Leiodes ovalis (Schm.) (*61) Kiplingcotes Nature Reserve, 10/8/80; J.H.F.

†*L. picea* (Panz.) (62) Langdale End, 15/7/78; R.S.K.

†*Anisotoma glabra* Kug. (63) Netherton, 7/8/83; M.L.D.

Catops coracinus Kell. (*63) Broadhead Clough, 16/4/83; M.L.D.

Necrodes littoralis (L.) (*65) Leyburn, 22/10/80; M.L.D.

Micropeplus staphylinoides Marsh. (61) Wharram Quarry, 18/8/81; R.S.K.

†*Proteinus crenulatus* Pand. (62) Raincliffe Wood, 12/10/79; R.S.K. (63) Blackmoorfoot, 21/10/82; M.L.D. det. P. M. Hammond.

P. macropterus (Grav.) (*61) Skipwith Common, 28/7/80; R.S.K.

†*Phyllodrepa salicis* (Gyll.) (62) Duncombe Park, 30/9/80; P.S.

Dropephylla grandiloqua (Luze) (*63) Thorne Moor, 3/6/72; H.E.F. det. C.J. (64) Timble Ings, Otley, 20/8/78; R.C. det C.J. Only previously at Malham Tarn.

Omalium italicum Bern. (*64) Farnley Lake Wood, 23/4/77; R.C. (*teste* C.J.).

O. rugatum Muls. (64) Breary Marsh, Leeds, 26/11/78; R.C. (*teste* C.J.). Only previously at Malham Tarn.

Bledius atricapillus (61) North Ferriby, on the Humber shore at the base of Red Cliffs, 18/6/77; R.C. Only previously in Yorkshire at Bridlington but see *B. dissimilis* below.

B. defensus Fauv. (64) Banks of the R. Wharfe at Kettlewell, Barden Bridge, Denton (Ilkley) and Rougemont (Weeton), 1974; R.C.

B. dissimilis Er. (61) North Ferriby, extensive colonies at the base of Red Cliffs on the Humber shore, 18/6/77; R.C. Only previously in Britain at Bridlington where the habitat, which was still there in 1966, has by 1983 been completely obliterated by sand dune.

B. femoralis (Gyll.) (62) Strensall Common, 6/5/78; R.C. Only previously at Scarborough 1904.

B. gallicus (Grav.) (*63) Thorne Moor, 23/5/75; R.C. Shirley Pool, Askern, 22/6/75; R.C. Elland gravel pits, 2/10/81; M.L.D.

B. longulus Er. (*64) Denton, 27/7/74; R.C. Boroughbridge, 30/6/77; R.C.

Ochthephilus omalinus (Er.) (*64) R. Wharfe, East Keswick, 22/2/76, 28/10/78; R.C. (*teste* C.J.).

Carpelimus impressus (Lac.) (*63) Fishlake, Doncaster, 3/7/76; R.C. (*teste* P. M. Hammond).

†*Anotylus mutator* (Lohse) (63) Ramsden Clough, in cow dung, 13/6/81; R.J.M. Langsett, 27/5/82; M.L.D.

†*Oxytelus fulvipes* Er. (64) Askham Bog, 2/7/76; H. K. Kenward (1977, *Entomologist's mon. Mag.*, 113:80). Breary Marsh, 3/9/78; R.C. (*teste* C.J.).

Stenus brevipennis Thoms. (*61) Skipwith Common, 14/10/79; R.C. A fen beetle.

S. carbonarius Gyll. (*64) Birkin, 4/1/75; Askham Bog, 6/5/78; R.C.

S. comma LeConte (64) Farnham gravel pits, 1/7/76; R.C. det. C.J. East Keswick, banks of R. Wharfe, 9/6/79; R.C.

S. fuscicornis Er. (*64) Middleton Wood, Ilkley, 23/2/74; R.C. Barnard Castle in 1920 the only other.

S. lustrator Er. (*62) Ashberry Pastures Nature Reserve, 4/11/78; R.C. Thorne the only other.

Stenus melanarius Steph. (61) Skipwith Common, 14/10/79; R.C. (*63) Melton Wood, 13/9/83; R.J.M. (*64) Farnham gravel pits, 4/8/79; R.C.

†*S. niveus* Fauv. (61) Skipwith Common, 14/10/79; R.C.
†*S. oscillator* Rye (63) Blackmoorfoot, Huddersfield, in leaf litter, 1/12/81; M.L.D. (*teste* E.W.A.).
S. pallipes Grav. (*61) Wheldrake Ings, 14/2/76; R.C. (63) Shirley Pool, Askern, 7/4/83; R.J.M. Wheatley Wood, 1902, the only other.
†*S. solutus* Er. (63) Rushy Moor, Askern, 14/7/82; P.S.
S. subaeneus Er. (64) Askham Bog, 19/6/74; R.C. No other records in the past 60 years.
Euastethus laeviusculus Mann. (*64) Askham Bog, 1/9/78. (63) Thorne Moor, 20/7/75; R.C.
Paederus riparius (L.) (*62) Strensall Common, 23/7/79; P.K. Very old records from Askham Bog and Hornsea Mere are the only others.
Sunius melanocephalus (F.) (*61) Spurn, 5/9/82; M.L.D. Not reported in this century.
Nudobius lentus (Grav.) (*61) Skipwith Common, 21/10/79; J.H.F.
Philonthus agilis (Grav.) (63). Ogden Clough, 9/7/83; M.L.D. There are only three other records, all more than 60 years old.
P. corvinus Er. (*61) 5/6/79; Elloughton Hill, 5/6/79; R.S.K.
P. debilis (Grav.) (*63) Blackmoorfoot, 2/12/81; M.L.D. (*64) High Batts Nature Reserve, North Stainley, 9/5/81; M.L.D.
P. nigriventris Thoms. (*63) Whiteholm, 24/7/83; M.L.D.
†*P. parcus* Shp. (63) Gildersome, 3/5/65; E.W.A. Birkin, 2/5/82; M.L.D. (*teste* P. M. Hammond).
P. rotundicollis (Mén.) (*63) Melton Wood, 27/8/80; R.J.M. (*64) Fairburn, 8/2/81; M.L.D.
P. rubripennis Steph. (62) Duncombe Park, on wet, riverside shingle, 10/5/80; J.H.F.
†*Platydracus latebricola* (Grav.) (62) Ellerburn Bank Nature Reserve, 13/5/73; Gundale, 3/5/80; J.H.F.
Quedius fulvicollis (Steph.) (*62) Cockayne, 27/8/79; R.S.K. Ashberry Pastures, 1/1/81; J.H.F.
†*Q. nemoralis* Baudi (61) Saltmarshe Delph Nature Reserve, 20/12/80; R.S.K.
†*Q. riparius* Kell. (63) Hook, river mud strand line, 6/9/80; R.S.K.
Q. semiaeneus Steph. (*63) Blacktoft sands, 8/2/81; M.L.D. Chiefly coastal.
†*Sepedophilus testaceus* (F.) (61) East Dale, 10/2/80; R.S.K.
Tachyporus formosus Matth. (*64) Knaresborough Ringing Station, 11/7/82; M.L.D.
†*Rybaxis laminata* (Mots.) (64) Dunsforth, 16/4/79; R.C.
R. longicornis (Leach) (*64) Dunsforth, 3/6/79; R.C.
Claviger testaceus Preys. (62) Gundale, on an exposed, steep, stony slope with the little yellow ant *Lasius flavus*, 31/5/75; J.H.F. Robin Hoods Bay, 1911, is the only previous record.
Aegialia sabuleti (Panz.) (64) Otley, banks of R. Wharfe, 1/6/83; R.C. (*65) West Tanfield, river sandbanks, 14/4/82; J.H.F.
Cyphon hilaris Nyh. (*62) Saltergate Moor, 17/7/78; R.S.K. (*63) Thorne Moor, 6/7/83; R.J.M. (64) Penyghent, 7/81; J. A. Owen.
†*Morychus aeneus* (F.) (61) Filey, 14/12/80; M.L.D.
Byrrhus arietinus Steff. (*62) Lockton High Moor, 1983; R.G.B. The only previous record is from Skipton.
Heterocerus flexuosus Steph. (*63) Rushy Moor, 22/6/75; J.H.F.
H. maritimus G.-M. (*64) Wharfe Mouth, 2/6/74; J.H.F.
†*Ampedus nigrinus* (Hbst.) (64) Bishop Wood, 3/8/79; R.C.
†*Cantharis figurata* Mann. (63) Treeton, 1/7/79; W.A.E.
Rhagonycha translucida (Kryn.) (62) Ashberry Pastures, 9/7/78; J.H.F.
Silis ruficollis (F.) (*61) Hornsea Mere, in water traps in reed bed, 22–30/6/77; R. Hawley, P.S. Only otherwise known from Shirley Pool.
Pyropterus nigroruber Deg. (*64) Bishop Wood, in flight, 14/7/79; J.H.F., others a few days later by B. J. MacNulty and R.J.M.
Megatoma undata (L.) (*63) Shirley Wood, under bark, 7/4/83; R.J.M.

Ctesias serra (F.) (*62) Duncombe Park, several times under bark of beech, 1977–1983; F.A.H., P.S.

Dorcatoma chrysomelina (Stm.) (*61) Howden Common, 1/7/83; P.K.

†*Pseudeurostus hilleri* (Reitt.) (63) Netherton, 25/11/83; M.L.D. An established alien.

Aplocnemus nigricornis (F.) (62) Bridestones Nature Reserve, 26/7/81; J.H.F. Only one previous old, undated record.

†*Anthocomus rufus* (Hbst.) (63) Potteric Carr, one, 1981; S.F. Sandall Beat Fen, sparingly among *Phragmites*, 9/82; P.S. Thorne Moorends, 30/7/83; R.C.

Meligethes subrugosus Gyll. (61) Cottam Well Dale, 1983; R.G.B.

†*Glischrochilus quadripunctatus* (L.) (62) Ellerburn, 29/9/79; J.H.F. (64) Timble Ings, 28/9/80; R.C.

Rhizophagus picipes (Ol.) (*63) Sandall Beat, one, dead, in Noctule bat pellet, C. A. Howes det. P.S. (*64) Washburn Valley, 8/6/83; R.C.

Psammoecus bipunctatus (F.) (*61) Hornsea Mere, several in water traps in reed beds, 6/77; R. Hawley det. P.S. Only previously at Askern.

Atomaria fuscicollis Mann. (*62) Duncombe Park, 18/6/83; R.J.M. (64) Bishop Wood, 18/4/83; R.J.M. (*65) Bedale, 18/7/82; M.L.D. det. C.J.

†*A. morio* Kol. (61) Hornsea Mere, 4/80; R.J.M. det. P.S. Also 2 in barn owl pellets in hollow tree formerly occupied by jackdaws, 6/80; R. Hawley det. C.J. Very rare; known in Britain otherwise only from Windsor Forest and Wicken Fen.

A. strandi Johnson (*63) Howell Wood, 9/7/77; P.S. det C.J.

Phalacrus caricis Stm. (63) Rushy Moor, abundant in open fen, 14/7–10/8/82; P.S. Ackworth, undated but pre-1900, is the only other.

†*Stilbus oblongus* (Er.) (61) Hornsea Mere, in reed-bed water traps, 7/77 and 23/6/79; R. Hawley det P.S. (63) Thorne Moor, 20/1/71; P.S.

‡*Exochomus nigromaculatus* (Goeze) (63) Rossington Bridge, 9/67; P.S. who writes 'Recorded by Stephens from single specimens from Windsor, taken in 6/1816, and from Bristol shortly afterwards. It had not been seen again in Britain and had been deleted from the British list.' A search for it in the Doncaster district is recommended.

Harmonia quadripunctata (Pont.) (*62) Strensall Common, 31/11/74; J.H.F. This conspicuous ladybird has now spread widely over much of Yorkshire on pine trees.

†*Lithostygnus serripennis* Broun (61) Spurn, 2/10/82; M.L.D. (63) Crosland Moor, Huddersfield, 25/3/82; M.L.D.

Cis setiger Mell. (*64) Wistow, in abundance, 10/8/83; E.W.A. Allerthorpe Common in 1916 is the only other record.

Bitoma crenata (F.) (*62) Duncombe Park, 18/6/83; J.H.F.

†*Pyrochroa coccinea* (L.) (62) Duncombe Park and more sparingly at Ashberry Pastures, 1979–1983; F.A.H. and P.S. Rievaulx, 7/6/81; J.H.F. A strong population of this very conspicuous cardinal beetle; larvae abundant under bark on old stumps. It is much more plentiful here than the common *P. serraticornis* (Scop.).

Phloiotrya vaudoueri Muls. (63) Hatfield Moor, one in dead oak branch near Lindholme Hall, 20/5/80; P.S. Reported twice previously, in 1895 and 1954.

Conopalpus testaceus (Ol.) (*62) Duncombe Park, 21/5/80; J.H.F. (63) Potteric Carr, 15/8/79; R.J.M. Crowle Waste, 22/7/83; R.J.M.

Mordellistena pumilla (Gyll.) (63) Barnby Dun, 14/7/78; Hatfield Lings, 17/7/80; Thorne Moor, 26/6/83; P.S.

Ischnomera caerulea (L.) (62) Duncombe Park, Helmsley, in small numbers, 10/6/79–6/83; F.A.H. and P.S. (1981, *Entomologist's mon. Mag.*, **116**: 129–132).

‡*I. cinerascens* (Pand.) (62) Duncombe Park, sparingly with the above.

I. sanguinicollis (F.) (62) Duncombe Park, in profusion with the above.

†*Aderus populnea* (Panz.) (61) Holme upon Spalding Moor, 4/7/81; M.L.D.

Leptura sexguttata (F.) (62) Ashberry Pastures, 6/6/76; J.H.F.

†*Phymatodes alni* (L.) (63) Thorne Moor, one on grass below a sallow bush, J.T.B. The only other record, from Wakefield by E. B. Wrigglesworth in 1882, was believed by G. B. Walsh to be erroneous.

P. testaceus (L.) (62) Duncombe Park, one dug from freshly dead oak branch, 10/6/80; P.S. Four earlier records are associated with houses or imported timber; this is the first to be reported in the natural habitat.

Plateumaris affinis (Kunze) (62) Newtondale, near Saltergate, in numbers on *Menianthes trifoliata*, 3/7/83; J.H.F.

Cryptocephalus aureolus Suffr. (*61) Fordon Bank Nature Reserve, 5/6/77; J.H.F.

†*C. biguttatus* (Scop.) (62) Fen Bog Nature Reserve, sparingly on *Erica*, 10/7/83; J.H.F.

C. parvulus Muell. (63) King's Wood, Hawtrey, one larva on birch, adult emerged 2/5/83; P.S. Only previously found in Martin Beck Wood, 1917.

Chrysolina marginata (L.) (65) Askrigg Common, a single example on roadside grass verge, 30/5/78; J.H.F. The only record of this distinctive and rarely found beetle since 1917.

Hydrothassa hannoveriana (F.) (64) Fountains Fell, on *Caltha* in a shallow, very wet and mossy gully, 22/7/73; J.H.F.

†*Plagiodera versicolora* (Laich.) (63) Denaby Ings Nature Reserve, one on *Salix fragilis*, 19/6/82; P.S.

Chrysomela aenea L. (62) Gundale, 9/6/79; Gerrick Woods, 4/6/83, commonly on alder; J.H.F. Staindale, 1983, R.G.B. Buttercrambe Wood appears to be the only other reported Yorkshire station.

Pyrrhalta viburni (Pk.) (*63) Melton Wood, 19/8/79; R.J.M. Maltby Low Common, 4/9/82; R.J.M.

Phyllobrotica quadrimaculata (L.) (*63) Treeton, on *Scutellaria*, 1/7/79; W.A.E. and R.J.M. Rushy Moor, 19/7/83; R.J.M.

†*Phyllotreta nodicornis* (Marsh.) (61) Kiplingcotes Nature Reserve, 2/7/77; J.H.F. (63) Potteric Carr Nature Reserve, 11/6/83; M.L.D.

P. ochripes (Curt.) (*61) Wheldrake Ings Nature Reserve, 28/12/82; J.H.F.

†*Aphthona atrovirens* Foerst. (63) Levitt Hagg, 13/5/83; R.J.M.

A. lutescens (Gyll.) (63) Elland gravel pits, 3/10/81; M.L.D. The only other record is from Askern in 1906.

†*Longitarsus pellucidus* (Foud.) (63) Blacktoft Sands, 21/8/81; M.L.D. det. M. Cox.

Haltica lythri Aub. (*61) South Cliff Common, 4/7/81; M.L.D. (63) Thorne Moor, 17/7/82; R.J.M. Elland gravel pits, 19/3/83; J.H.F. Shirley Wood, 7/4/83; R.J.M.

†*Epitrix pubescens* (Koch.) Thorne Moor, 17/7/82, on *Solanum*; R.J.M.

†*Podagrica fuscicornis* (L.) (62) Sandsend, 23/7/81; R.C.

Anthribus resinosus (Scop.) (*62) Strensall Common Nature Reserve, on *Daldinia* on old birch, 15/4/73; J.H.F. (63) Thorne Moor, under log, 21/5/83; R.J.M. The only other Yorkshire record is from Sandall Beat.

Rhynchites cupreus (L.) (*62) Bridestones, on rowan, 17/6/73; J.H.F.

Apion aethiops Hbst. (*63) Fishlake, 3/7/76; K.G.P.

†*A. filirostre* Kby. (62) Port Mulgrave, on *Vicia sylvatica* on sea cliffs, 14/6/75; K.G.P.

A. spencei Kby. (*61) Pocklington Canal, Giles Lock, 23/5/70; K.G.P.

A. subulatum Kby. (*63) Fishlake, 3/7/76. (*64) Askham Bog, 22/7/67; K.G.P.

A. viciae (Payk.) (*61) Pocklington Canal, Giles Lock, 23/7/70; K.G.P.

A. vorax Hbst. (*63) Langold Holt (SK/58), 24/4/82; W.A.E.

Otiorrhynchus nodosus (Muell.) (*65) Masham Moor, 29/7/73; J.H.F.

†*O. porcatus* (Hbst.) (64) Gargrave, 8/5/82; M.L.D. (*teste* E.W.A.).

†*Polydrosus chrysomela* (Ol.) (61) Stone Creek, in numbers on *Artemisia maritima*, 7/6/80; P.S.

†*Tropiphorus obtusus* (Bons.) (64) Carthick Wood, East Keswick, 9/6/79; R.C.

†*Sitona cambricus* Steph. (64) Bishop Wood, 19/6/81; R.C.

S. lineellus (Bons.) (*64) Grafton, 3/9/77; R.C.

Hypera diversipunctata (Schr.) (*63) Inkle Moor, Thorne, 5/8/72; P.S.

†*Magdalis phlegmatica* (Hbst.) (64) Goldsborough, 15/5/82; M.L.D. (*teste* E.W.A.). Timble Ings, 1/6/83; R.C.

Euophryum confine (Broun) (63) Pudsey, in a bank, 10/79; R.C.

Pentarthrum huttoni Woll. (*61) Hemingbrough, 20/4/83; P.K.

Dorytomus longimanus (Forst.) (*64) Otley, on *Populus alba* on the banks of the R. Wharfe, 24/6/83; R.C.

D. salicinus (Gyll.) (*61) Allerthorpe Common, 8/9/79; J.H.F.

D. salicis Walton (*62) Strensall Common, 15/7/72; K.G.P.

D. tremulae (F.) (*63) Crowther Wood, Sandall Beat, in quantity on dead leaves of *Populus canescens*, 5/7/82; P.S. The first record since about 1850 (Knaresborough).

Notaris scirpi (F.) (63) Wilthorpe Marsh, Barnsley, 18/6/67; R.C. Thorne Moor, 7/5/79; R.C.

Ceutorhynchus asperifoliarum (Gyll.) (*64) Ryther, 6/6/70; K.G.P.

†*C. timidus* Weise (63) Sprotborough Flash Nature Reserve, 11/9/82; R.J.M.

†*Furcipes rectirostris* (L.) (62) Newtondale, in numbers on *Prunus padus* near Levisham Station, 30/5/82 (1984, *Entomologist's Gaz.*, **35**:95). Also again and at Cropton, 30/5/84; J.H.F.

Curculio betulae (Steph.) (*61) North Cliffe, 24/9/77; R.C. (63) Goole Moors, 8/7/76; R.C.

C. venosus (Grav.) (*64) Brayton Barff, Selby, 26/5/82; P.K.

C. villosus F. (*64) Middleton Woods, Ilkley, 13/6/72; R.C.

†*Tychius meliloti* Steph. (61) Filey, sea cliffs, 3/8/67; K.G.P. (64) Towton Bar, 16/7/61; K.G.P.

†*Scolytus multistriatus* (Marsh.) (63) Melton Wood, 4/5/83; Eggborough, 3/6/83; under elm bark, R.J.M.

Dryocoetinus villosus (F.) (*63) Hemingbrough, 20/4/83; P.K.

Dryocoetes autographus (Ratz.) (*61) Rise Wood, 12/6/82; M.L.D. (*teste* E.W.A.). (*64) Timble Ings, 12/10/80; R.C.

Xyleborus dispar (F.) (*62) Strensall Common, on pine, 21/5/78; J.H.F. (63) Thorne Moor, 20/5/75; R.C.

†*Pityogenes quadridens* (Hart.) (64) Bishop Wood, 20/11/82; R.C.

The following beetles, many of them of rather local distribution but of more frequent occurrence than those above, have been recorded for the first time in the vice-counties listed.

V.C.61; *Mycetoporus nigricollis* Steph., *Tachinus laticollis* Grav., *Hypera venusta* (F.), *Stenocarus umbrinus* (Gyll.), *Ceutorhynchus depressicollis* (Gyll.), *Gymnetron pascuorum* (Gyll.), *Hylesinus crenatus* (F.), *Acrantus vittatus* (F.).

V.C.62; *Bryaxis puncticollis* (Denny), *Apion tenue* Kby., *Strophosomus capitatus* (Deg.), *Hypera suspiciosus* (Hbst.), *Dorytomus dejeani* Faust., *Ceutorhynchus alliariae* Bris., *C. depressicollis* (Gyll.).

V.C.63; *Ilybius aenescens* Thoms., *Cercyon quisquilius* (L.), *Enochrus affinis* (Thunb.), *Choleva fagniezi* Jean., *Megarthrus denticollis* (Beck.), *Xylodromus depressus* (Grav.), *Carpelimus rivularis* Mots., *Stenus picipes* Steph., *S. pusillus* Steph., *Philonthus cephalotes* (Grav.), *P. ventralis* (Grav.), *Gabrius piliger* Muls., *Staphylinus fuscatus* Grav., *Tachinus pallipes* (Grav.), *Ptinomorphus imperialis* (L.), *Longitarsus atricillus* (L.), *L. pratensis* (Panz.), *Micrelus ericae* (Gyll.), *Phytobius comari* (Hbst.), *Hylastinus obscurus* (Marsh.), *Hylastes opacus* Er.

V.C.64; *Cercyon lugubris* (Ol.), *Phloeonomus pusillus* (Grav.), *Anotylus inustus* Grav., *Bibloporus bicolor* (Denny), *Reichenbachia juncorum* (Leach), *Strophosomus faber* (Hbst.), *Sitona sulcifrons* (Thunb.), *Apion carduorum* Kby., *Cneorrhinus plumbeus* (Marsh.), *Rhynchaenus alni* (L.), *R. avellanae* (Don.), *R. foliorum* (Muell.).

V.C.65; *Haliplus confinis* Steph., *Laccophilus minutus* (L.), *Autalia puncticollis* Sharp, *Anthrenus museorum* (L.), *Meloe violacea* Marsh, *Acalles ptinoides* (Marsh.).

RECORDER'S REPORT ON THE ACULEATE HYMENOPTERA IN YORKSHIRE

MICHAEL E. ARCHER

The last report on Yorkshire Hymenoptera covered the period 1975–78 (*Naturalist* **105**: 54–55). Since that time the Hymenoptera have been divided into three groups, each with their own recorder or recorders: Symphyta, Mr J. H. and Mrs H. E. Flint; Parasitica, W. A. Ely; Aculeata, Dr M. E. Archer. This is thus my first aculeate report and gives details of twelve new species recently recognised as occurring in the Watsonian county of Yorkshire. Initials of collectors are as follows: M. E. Archer (M.E.A.), M. D. Barnes (M.D.B.), A. Brackenbury (A.B.), H. Britten (H.B.), J. T. Burn (J.T.B.), R. Butterfield (R.B.), W. A. Ely (W.A.E.), D. Fishardel (D.F.), W. J. Fordham (W.J.F.), J. H. Flint (J.H.F.), W. D. Hincks (W.D.H.), W. J. Lee (W.J.L.), S. Shaw (S.S.), H. N. Whiteley (H.N.W.), J. Wood (J.W.).

The first five species are the result of the splitting of the chrysid wasp, *Chrysis ignita*, s.l. by Morgan D. (1984, *Handbooks for the Identification of British Insects*, Vol. 6, Part 5. Cuckoo-wasps. Hymenoptera, Chrysididae). Most of the following specimens have been named by D. Morgan or M. Spooner. Many of the specimens were found in the collections of the museums at Doncaster, Keighley, Leeds, Manchester, Scarborough and Sheffield, and I would like to thank the curators for permission to borrow and examine these specimens.

C. ignita s.l. has a thick and heavily sculptured cuticle, richly coloured in brilliant metallic blue, green and red. The adults are often found feeding at flowers or extra-floral nectaries or investigating holes in various substrates, the possible nesting sites of their hosts. However I usually find them stationary on white dead wood in a sheltered sunny situation. The five Yorkshire species use mason-wasps (Eumenidae) as their hosts but *C. angustula* also uses crabronine wasps (Sphecidae). Usually the chrysid larva eats the egg or young larva of its host before eating the food stores.

C. angustula Schenck, 1856. Distributed throughout England as far north as Yorkshire.
V.C. 62. Strensall (SE 66) (June 1983, M.E.A.); Sand Hutton (SE 65) (June 1984, M.E.A.); Caydale (SE 58) (July 1985, M.E.A.); Duncombe Park (SE 68) (July 1980, J.H.F.; Aug. M.E.A.).
V.C. 63. Askern (SE 51) (June 1938, M.D.B.); near Blaxton Common (SE 60) (July 1972, July 1978, J.T.B.); Crow Wood (SK 69) (June 1981, J.T.B.); Potteric Carr (SE 50) (June 1982, J.T.B.); Blaxton Common (SE 60) (Aug. 1984, M.E.A.).

C. ignita (Linn., 1758) s.s. Common and distributed throughout England.
V.C. 61. Bubwith (SE 73) (May–July 1916–1936, W.J.F., J.W.); Spurn (TA 41) (June–July 1948–1952, W.D.H., S.S.); Stone Creek (TA 21) (June 1980, M.E.A.); Skipwith (SE 63) (June 1984, M.E.A.).
V.C. 62. Scalby (TA 09) (June 1959, W.D.H.); Sand Hutton (SE 65) (July 1977, W.J.L.); York (SE 65) (June–Sept. 1977–1982, M.E.A.).
V.C. 63. Elland (SE 12) (June 1935, M.D.B.); Bingley Wood (SE 13) (Aug. 1927); Holmehouse (SE 04) (July 1921); Keighley (SE 04) (June 1948, J.W.); Esholt (SE 13) (May/June 1978, H.N.W.); Sandall Beat Wood (SE 60) (June 1984, M.E.A.); Duncombe Park (SE 68) (July 1985, M.E.A.).
V.C. 64. Chapel Allerton (SE 33) (July 1975, J.T.F.).

C. impressa Schenck, 1856. Common and distributed throughout England.
V.C. 61. Thorganby (SE 64) (June 1919, W.J.F.); Bubwith (SE 73) (June 1909–1936,

W.J.F., J.W.); Allerthorpe (SE 74) (June 1936, W.D.H.).
V.C. 62. Fen Bog (SE 89) (July 1937, H.B.); Duncombe Park (SE 68) (June–July, 1983–1985, J.T.B., M.E.A.); Caydale (SE 58) (June 1984, M.E.A.); Cayton Bay (TA 08) (July 1983, M.E.A.).
V.C. 63. Wilsden (SE 03) (June 1908, R.B.); Shipley (SE 13) (June 1918); Dearne (SE 40) (June 1977); Askern (SE 51) (June 1976–1983, J.T.B.); Blaxton Common (SE 60) (June–Sept., 1972–84, J.T.B., M.E.A.); Armthorpe (SE 60) (Aug. 1980, J.T.B.); Highfields (SE 50) (July 1983, J.T.B.); Sandall Beat Wood (SE 60) (June 1983, J.T.B.); Hatfields Lings (SE 60) (June 1976, J.T.B.); Barnaby Dun (SE 60) (June 1980, J.T.B.); Crow Wood (SK 69) (June 1978, J.T.B.); Bentley Common (SE 50) (June 1974, J.T.B.); Shipley Glen (SE 13) (July 1985, M.E.A.).
V.C. 64. Blackmoor (SE 23) (June 1931); Aberford (SE 43) (June–July 1936, J.W., W.D.H.); Bentham (SD 66) (June 1935, M.D.B.); Adel (SE 24) (June 1936, D.F.); Dallowgill (SE 17) (July 1979, J.H.F., M.E.A.).

C. mediata Linsenmaier, 1959. Moderately common in southern England, Yorkshire is on its northern border.
V.C. 61. Spurn (TA 41) (July 1948, W.D.H.).

C. rutiliventris Abeille de Perrin, 1879. Locally moderately common throughout England.
V.C. 61. Bubwith (SE 73) (June–Aug. 1918–1919, W.J.F.); Allerthorpe (SE 74) (Aug. 1927).

The remaining seven species seem to be genuine additions to the Yorkshire list:

Omalus violaceus (Scopoli, 1763). Until the following records, this species was not recorded north of Leicestershire.
V.C. 62. Duncombe Park (SE 68) (Aug. 1985, M.E.A.).
V.C. 63. Denaby (SK 49) (Aug. 1985, J.T.B.).
The previous record of this species (*Naturalist* **44**: 38) is in error. The specimen, found at Manchester Museum, proved to be *O. auratus* (Linn., 1758).

Calliadurgus fasciatellus (Spinola, 1808). These records greatly extend the northern border of this species from Norfolk.
V.C. 62. Strensall (SE 66) (Aug.–Sept. 1981–1982, M.E.A.).

Crossocerus palmipes (Linn., 1767). Not common, but probably occurs throughout England.
V.C. 63. Crow Wood (SK 69) (July 1977–1982, J.T.B.); Rossington Bridge (SK 69) (July 1984, J.T.B.); Blaxton Common (SE 60) (Aug. 1984, M.E.A.).
Earlier reference to this species is probably a misidentification for *C. tarsatus* (Shuchard, 1837). Consultation of the longer Fordham card index shows this nomenclature change had not been made.

Crossocerus leucostoma (Linn., 1758). These records extend the southern boundary of this species.
V.C. 62. Strensall (SE 66) (May 1982, M.E.A.); Duncombe Park (SE 68) (June 1983, J.T.B.).

Ectemnius dives (Lepeletier & Brullé, 1835). These records indicate the continual northward spread of this species.
V.C. 63. Askern (SE 51) (June 1977, J.T.B.); Highfields (SE 50) (July 1983, J.T.B.); Denaby (SK 49) (July 1984, J.T.B.); Wharncliffe Wood (SK 39) (July–Aug. 1974–82, A.B.); Parkgate, Rotherham (SK 49) (Aug. 1976, W.A.E.).

Psenulus concolor (Dahlbom, 1843). These records extend the northern range of this species.
V.C. 62. York (SE 65) (June 1980, M.E.A.).
V.C. 63. Askern (SE 51) (June 1977, J.T.B.); Newton Quarry, Sprotborough (SE 50) (June 1980, J.T.B.); Bentley Common (SE 50) (July 1984, J.T.B.); Wharmcliffe Wood (SE 39) (July 1979, A.B.).

Hylaeus confusus Nylander, 1852. This solitary bee is probably found throughout England.
V.C. 62. Ashberry (SE 58) (Aug. 1976, J.H.F.); Caydale (SE 58) (June 1984, M.E.A.).
V.C. 63. Near Blaxton Common (SE 60) (July 1977, J.T.B.); Blaxton Common (SE 60) (June 1984, M.E.A.).

Y.N.U. BRYOLOGICAL SECTION: ANNUAL REPORT 1984–1985

T. L. BLOCKEEL

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Sectional meetings during 1984 and 1985 have been held as follows:

Spring 1984 — Saltersgate Beck (V.C. 62) April 7
Summer 1984 — Bradfield near Sheffield (V.C. 63) September 1
Spring 1985 — Hazlewood and Tadcaster (V.C. 64) April 6
Summer 1985 — Aysgarth (V.C. 65) September 7.

The Saltersgate and Bradfield meetings were highly successful and each revealed interesting and diverse bryophyte communities in very different habitats. The Hazlewood and Aysgarth meetings were less productive, the latter chiefly as a result of incessant rain on the day. Fuller reports are to be found in the Bulletin of the Yorkshire Naturalist's Union.

Records

Records have been received from Mr C. Wall, who has been doing some good work in the Doncaster district, and from Miss J. Robertson. Recorders' initials: T.L.B. = T. L. Blockeel, J.R. = J. Robertson, C.W. = C. Wall. An asterisk indicates a new V.C. record or an amendment to the *Census Catalogue*.

Reboulia hemisphaerica: (*63) Calcareous rocks, Roche Abbey district, F. A. Lees, 1876 (**CMM**). Otherwise unknown from V.C. 63.
Marchantia alpestris: (*61) Flower pots, University Botanical Gardens, Hull, R. J. Fisk, 1982 (*Bull. Brit. bryol. Soc.* **44**: 23).
Riccia cavernosa: (*63) 43/29 On exposed mud, More Hall Reservoir, Ewden, T.L.B., Sept 1984.
Metzgeria temperata: (64) 34/95 On sycamore and other trees, Winterburn Valley, T.L.B., Feb 1984.
Lophozia ventricosa var *silvicola*: (*62) Wet heath north of Osmotherley, J. A. Paton, 1967 (*Bull. Brit. bryol. Soc.* **44**: 24).
Lophozia ventricosa var *longiflora*: (*64) 44/14 On wet shale, Coldstone Beck, Burley Moor, T.L.B., 1983.
Jungermannia subelliptica: (*64) 34/65 Thin soil on slatey scar by beck, Croasdale, near Slaidburn, M. J. Wigginton, 1984 (*Bull. Brit. bryol. Soc.* **46**: 21).
Plagiochila killarniensis: (64) 34/77 On wet slate in ravine, Twistleton Glen, Ingleton, T.L.B., May 1984.

Plagiochila punctata: (65) 34/69 On wet rock in deep part of gill, Hebblethwaite Gill, near Sedbergh, T.L.B., July 1984.

Scapania curta: (*64) 44/25 On peaty soil on bank in pasture, Lindley Wood Reservoir, T.L.B., Feb 1985.

Scapania irrigua: (63) 44/60 In birch wood, Barnby Dun, C.W., Oct 1985.

Radula lindenbergiana: (*64) 34/77 On moist slate in ravine, Twistleton Glen, Ingleton, T.L.B., 1983.

Frullania fragilifolia: (64) 34/76 On pre-carboniferous rock above Helwith Moss, T.L.B., Dec 1984.

Fissidens incurvus: (63) 44/61 On soil pocket on old log, Southfield Lane, East Cowick, C.W., Mar 1984.

Fissidens celticus: (*65) 34/69 Friable soil in sheltered pasture, Hebblethwaite Gill, near Sedbergh, T.L.B., July 1984.

Dicranella subulata: (*64) 34/65 Moist peaty clay by upland flush, Croasdale, near Slaidburn, M. J. Wigginton, 1984 (*Bull. Brit. bryol. Soc.* **46**: 22).

Desmatodon cernuus: (63) 43/38 Rocks, Bell Hagg, Rivelin, Amos Carr, 1880 (**CMM**). This record pre-dates all other British records of *D. cernuus* and is of additional interest in view of the untypical habitat. Almost all British localities for the species are on or near the Magnesian Limestone.

Hyophila stanfordensis: (*62) 44/55 Soil crevice in exposed tree root, Museum Gardens, York, C. D. Preston, 1984 (*Bull. Brit. bryol. Soc.* **46**: 24).

Barbula nicholsonii: (*65) 44/08 On limestone on banks of R. Ure, Aysgarth, T.L.B., Sept 1985.

Gymnostomum calcareum: (*65) 44/08 On moist tufa on banks of R. Ure, Aysgarth, T.L.B., Sept 1985. The previous record for V.C. 65 from Downholme near Richmond is based on a misidentification of *Oxystegus sinuosus* (det. H. L. K. Whitehouse).

Tortella inflexa: (*61) 44/85 Chalk lump in chalk grassland, Horse Dale, near Fridaythorpe, M. J. Wigginton, 1982 (*Bull. Brit. bryol. Soc.* **44**: 27).

Grimmia funalis: (64) 34/77 On rock face, upper part of Twistleton Glen, Ingleton, T.L.B., Feb 1985. A form without spirally twisted leaves.

Ephemerum sessile: (*63) 43/29 On exposed mud, Damflask Reservoir, T.L.B., Sept 1984.

Mnium marginatum: (63) 44/51 On stony ground, Brockadale Woods, Wentbridge, T.L.B., Apr 1984.

Mnium marginatum var *dioicum*: (*63) 44/13 On sandy soil by R. Aire, Bingley, T.L.B., Apr 1984.

Amblyodon dealbatus: (64) 34/97 On limestone on a flushed stream bank, Cowside Beck, Arncliffe, T.L.B. & C. C. Townsend, June 1984.

Orthotrichum lyellii: (64) 34/78 On sycamore, in small quantity, High Birkwith, Upper Ribblesdale, T.L.B., June 1984.

Orthotrichum affine: (63) 43/59 On willow trunk in wet ground by R. Don, Cadeby, T.L.B., Nov 1984. An unusual occurrence of this species as an epiphyte in industrial Yorkshire.

Orthotrichum rivulare: (*63) 44/04 On a tree base by R. Aire, Low Holden, Keighley, T.L.B., May 1984; (64) 34/97 Tree roots and stones by R. Wharfe, Buckden, T.L.B., Apr 1984.

Orthotrichum stramineum: (62) 44/99 On ash bole, Hackness, J.R., June 1984; (64) 34/95 On elder, Winterburn Valley, T.L.B., Feb 1984.

Orthotrichum pulchellum: (64) 34/95 On elder, Winterburn Valley, T.L.B., Feb 1984.

Ulota crispa var *norvegica*: (64) 34/95 On hazel and other trees, Winterburn Valley, T.L.B., Feb 1984.

Ulota phyllantha: (*63) 44/04 On an ash tree, in small quantity, by R. Aire, Low Holden, Keighley, T.L.B., May 1984. The first record of this epiphytic genus in V.C. 63 during the present century.

Cryphaea heteromalla: (*64) 34/95 On elder, Winterburn Valley, T.L.B., Feb 1984; 34/67 On elder in very small quantity, Meal Bank, Ingleton, T.L.B., Oct 1984. For a fuller account of the rediscovery of this species in Yorkshire see Blockeel (1984).

Homalia trichomanoides: (63) 34/95 On shaded limestone, Broughton Beck, Broughton, T.L.B., Dec 1984.

Myrinia pulvinata: (*62) 45/70 Tree boles in flood zone of R. Esk, Danby, J.R., 1983.

Plagiothecium denticulatum var *obtusifolium*: (64) 34/77 On a turfy overhang on the limestone cliffs, Ingleborough, T.L.B., Oct 1984.

Hypnum mammillatum: (*63) 34/93 On a grit boulder, Hardcastle Crags, T.L.B., Feb 1984; 34/95 On trees, Broughton Beck, Broughton, T.L.B., Dec 1984.

Rhytidiadelphus loreus: (*63) 34/93 On a rotting log by the Hebden Water, Hardcastle Crags, T.L.B., Feb 1984. First record for V.C. 63 during the present century.

Hylocomium brevirostre: (64) 34/97 Among limestone rocks, Scoska Wood, Littondale, T.L.B., Oct 1984.

Corrections

The following herbarium specimens have been examined and found to be incorrectly named.

Preissia quadrata: (63) Calcareous rocks, Roche Abbey district, F. A. Lees, 1876 (**CMM**). This is *Reboulia hemisphaerica* (see above).

Metzgeria leptoneura: (64) Pecca Falls, Ingleton, F. E. Milsom, 1925 (**BBSUK**). This is *M. conjugata*. *M. leptoneura* is otherwise unknown in Yorkshire.

Riccardia palmata: (63) Waleswood, A. Carr, 1878 (**CMM**). The specimen is probably *R. chamedrifolia* and certainly not *R. palmata*, which should be deleted for V.C. 63.

Sphagnum molle: (63) Wyming Brook, A. Thompson (**BBSUK**). This is *S. subnitens* (conf. M. O. Hill). Other records for this species from the Sheffield district are also likely to be erroneous.

Ceratodon purpureus ssp *conicus*: (63) Bell Hagg, Rivelin, A. Carr, 1880 (**CMM**). This is *Desmatodon cernuus* (see above).

Amblystegium humile: (63) Byram Quarry, Knottingley, W. Ingham, 1900 (**NMW**). This is *A. serpens* (det. M. O. Hill). There are two recent records for *A. humile* in V.C. 63.

Reference

Blockeel, T. L. (1984). The moss *Cryphaea heteromalla* refound in Yorkshire. *Bulletin Yorkshire Naturalists' Union* **2**: 11.

BOOK REVIEWS

Agriculture and the Environment edited by **David Jenkins**. Pp. 195, including figures. Institute of Terrestrial Ecology, Cambridge, 1984. £7.

The environmental impact of agricultural practices in Britain has generated considerable interest, much controversy and an increasingly impassioned debate over the past three decades. Discussion has not always been well-informed, and for those requiring a detailed comprehension of the impacts on wildlife of a selection of past and present agricultural practices this volume provides an authoritative source.

It contains 30 papers given at a symposium organized by the Institute for Terrestrial Ecology in February 1984 which considered the impact of changes in agriculture on the environment. Papers on the future direction of agricultural policy in Britain and the EC provide a context for subsequent papers covering a range of agricultural practices from drainage to pesticide usage, as well as the problems of monitoring environmental change in a number of different settings. The narrowness of many of the papers is made

acceptable by the editor's imposition of a uniform hand on the contributions. The eight pages devoted to reporting the discussions held during the symposium also prove their worth by drawing together themes and topics covered in individual papers. It is surprising that there is little comment on the future direction of environmental policy and its effect on agricultural practice and thence on the environment.

Overall, the value of the volume rests on both what it says and what it implies. At its most obvious, it provides important material for the ecologist and agriculturalist interested in exploring the interface between their disciplines. It also points to the need for a deeper understanding of the complex of interactions between the formulation, implementation and monitoring of agricultural policy, the decisions of the individual agents of land-use change and the environmental consequences of those decisions. The crucial, albeit partial, contribution of ecological research to that understanding is identified clearly. Important as these explicit points are, the volume also implies a responsibility on ecologists to perceive their research in its wider context, to develop skills in communicating their findings and in this way to help to break down the inertia caused by the single disciplinary approach to thinking that has characterized rural policy in the past.

NJR

The Correspondence of Charles Darwin. Volume 1. 1821–1836 edited by **F. Burkhardt** and **S. Smith**. Pp. xxxii + 702, b/w plates and end-paper genealogical table. Cambridge University Press. 1985. £30.

This volume represents the first fruits of an ambitious project sponsored by the American Council of Learned Societies, which commenced more than ten years ago. Based at Cambridge University Library, the editorial group has been able to trace nearly 14,000 letters, backing them up with a wealth of data on their content and the correspondents.

This inaugural volume contains 338 letters and covers Darwin's schooldays, his medical studentship at Edinburgh and undergraduate years at Cambridge, the five years of the *Beagle* voyage, and the short but important period following his return to England. More than half the letters are to Darwin, ranging from those providing details of the social life of the English country gentry to those from scientists such as Henslow whose help and advice proved so invaluable to Darwin in these formative years. This volume is particularly strong in letters to and from his dear friend and second cousin W. D. Fox. Certain letters within the Darwin–Wedgwood circle, but not written by or to Charles Darwin, have also been included for the sake of completeness. In all, the correspondence provides a clear insight into the beginnings of Darwin's life-long involvement in science, although no inkling of his evolutionary views appears at this stage. The letters reveal his youthful uncertainties and the early signs of his ability to make detailed field observations, which was to prove so valuable in his later revolutionary theories.

The editors and many collaborators are to be congratulated on the wealth of information contained within this volume: as well as textual notes, the scholar is provided with 165 pages of critical material on, for example, chronology, biography and bibliography, and an excellent index, the whole work being lavishly produced at an affordable price.

MRDS

Travel Diaries of a Naturalist II by **Peter Scott**. Edited by **Miranda Weston-Smith**. Pp. 288, including numerous illustrations, colour plates and photographs. Collins, 1985. £12.95.

After the success of *Travel Diaries of a Naturalist* which was published in 1983, many of us have eagerly awaited the inevitable second volume. We have not been disappointed. *Travel Diaries of a Naturalist II* follows the same successful format of its predecessor. Again Miranda Weston-Smith's skilful editing of Scott's original diaries makes a very readable volume, much more so than the notebook-like format of a number of similar bird diaries published in recent years. The book is beautifully illustrated, Phillipa Scott's

scene-setting photographs supplementing Sir Peter's own pictures, ranging from margin sketches of birds and fish, beasts and flowers, to full-page colour paintings.

Scott's wish that 'his published diaries should retain as much as possible of their original character' is, I think, realized, particularly by the reproduction of actual pages from his diaries. For me these are amongst the highlights of the book and I am pleased that they have been published just as they were written — complete with crossings-out and question marks!

Book one concentrated mainly on the southern hemisphere, but this present volume takes us north, often aboard the nature tour ship 'Lindblad Explorer'. Here we share the thrills of whale and seal watching, encounter exotic seabirds like Crested and Parakeet Auklets and join shore parties in search of arctic wildflowers. Other travels take us on wild goose chases to Iceland after Pink-feet and to the Danube marshes in Rumania in search of the elusive Red-breasted Goose. But surely the most exciting journey must be the following of Slimbridge's Bewick's Swans back to their Siberian breeding grounds.

However, the book is not exclusively devoted to northern travels; we do get some sunshine studying migrating birds and desert gazelles in Israel and Humpback whales and reef fish in Hawaii.

This really is a book for all tastes. It allows arm-chair travellers to enjoy the wild places they will never visit, and to the globe-trotting naturalist it will bring back nostalgic memories of exotic birds and flowers in far-away places. Remarkably the price has been kept the same as the first volume, so it is very good value.

JKS

Cry of the Kalahari by **Mark Owens** and **Delia Owens**. Pp. 342, 47 colour plates. Collins, 1985. £9.95.

This is the story of two young American biologists who set up camp in Deception Valley in the Kalahari, where they lived for seven years. Here in their isolated location, they studied the larger carnivores, particularly jackals, brown hyenas and lions. Both authors have contributed to the book by writing alternate chapters and in so doing have highlighted different aspects of their fascinating life. They were supported by modest funds and had to adopt a simple way of life. Possibly because of this they identified themselves closely with the Kalahari and wrote perceptively and sensitively on it. Of particular interest was the almost unbelievable relationship they developed with Bones, a lion whose life they saved. This is a well written intriguing account supported by some high quality photographs. The book is thoroughly recommended.

AVD

A Dictionary of the Flowering Plants and Ferns by **J. C. Willis**, revised by **H. K. Airy Shaw**. Pp. xxii + 1245 + lxvi. Cambridge University Press. 1985. Student edition/8th edition. £20.

A very reasonably priced reissue in hardback of the edition first published in 1973 — an indispensable aid for the serious botanist.

Fledger by **Nicholas Barret**. Pp. 206, Michael Joseph. 1985. £8.95.

An unashamedly anthropomorphic novel about a puffin colony attacked by rats. Although the publishers claim that the story is an 'authentic reconstruction of life in a puffin flock', the author takes considerable biological licence. Nevertheless the result is still quite a reasonable book of its type.

I doubt if the hero, Goldie, will be remembered as long as other famous characters of wildlife fiction such as Tarka or Brighteyes, but if you enjoyed *Watership Down* you will probably like *Fledger*. However, the book is rather expensive and if you really want to know more about puffins you would be better off spending another £4 on M. P. Harris's recently published monograph.

JKS

Hawk-Moths of the British Isles by **Michael Easterbrook**, 35 plates mainly in colour; **The Puffin** by **Jim Flegg**, 14 colour plates and 6 black-and-white, mainly drawings; **Parasitic Worms** by **Jim Flegg**, 9 colour plates, 14 black-and-white plates and drawings; **The Starling** by **C. J. Feare**, 24 colour plates, 27 black-and-white, mainly photographs. Shire Natural History, 24 pp. each. Shire Publications Ltd., 1985. £1.25 each.

The first four numbers of this new series give a concise and up-to-date account of either a single or a group of species. Jim Flegg on the puffin also deals with recent changes in population numbers and gives information on where to watch puffins. C. J. Feare looks at the social life of starlings and their relationships with man; some of the colour plates in this booklet are a little dark. Michael Easterbrook deals with the 17 species of hawk-moth and all the adults and most of the caterpillars are illustrated in colour. The parasitic worms dealt with by Jim Flegg turn out to be the nematode or round worms; details are given on how to find and study these worms besides much information on the species parasitic on animals and plants. Each booklet contains a useful list of further reading and is a bargain at £1.25.

MEA

Woodlice in Britain and Ireland: Distribution and Habitat by **P. T. Harding** and **S. L. Sutton**. Pp. 151, with 14 figs, 4 tables and 36 maps. Institute of Terrestrial Ecology, NERC. 1985. £5.50 including postage & packing from: Institute of Terrestrial Ecology, Monks Wood Experimental Station, Abbots Ripton, Huntingdon PE17 2LS.

This book is the definitive write-up of the woodlouse recording scheme and is a 'must' not only for woodlouse enthusiasts but also for natural historians interested in mapping and habitat schemes. Besides the usual distribution maps in the species-by-species section, quantitative data are given of the habitats in which each species is found. Sixteen pages are also devoted to a habitat-by-habitat survey so that the woodlice assemblages characteristic of each are clearly defined. Data are compiled from some 23,499 records sent in by 436 recorders over a period of 16 years so that an unusually detailed analysis can be presented — a very fine achievement. Keys to species are not given, but a lengthy set of references, covering much more than published keys give access to them. However, detailed descriptions with figures are given of four species new to the British Isles, including one new to science. The history of the scheme is presented, including details of the different recorder cards with the elaborate instructions on how they should be filled up. This book is a milestone in the development of mapping and habitat surveys of the British fauna.

MEA

Our Green and Living World. The Wisdom to Save It by **E. S. Ayensu, V. H. Heywood, G. L. Lucas** and **R. A. Defilipps**. Pp. 256, with full colour illustrations. Cambridge University Press. 1984. £12.95.

Green Inheritance by **Anthony Huxley**. Pp. 193, with full colour illustrations, line drawings, maps, etc. Collins/Harvill Press. 1985. £9.95.

Two lavishly produced books covering very similar ground, each portraying the wealth and beauty of the world's flora. Both feature the economic importance of plants, and highlight the fragility of ecosystems, particularly in terms of the exploitation of natural resources. Attention is rightly paid to the demise of tropical rain forests, which are disappearing at such an alarming rate, and to the still largely unexplored potential of such habitats for man's future needs for food, medicine, timber, etc. Tropical rain forests and other natural habitats provide a vital genetic bank whose resources should not be squandered. The attractive and informative illustrations are complemented in both volumes by authoritative and powerful texts. Either book would be an attractive acquisition, but they are so similar in content and format that purchase must be a matter of individual choice.

MRDS

The Cambridge Encyclopedia of Life Sciences edited by **Adrian Friday** and **David S. Ingram**. Pp. 432, with numerous colour illustrations, b/w plates, maps, tables, etc. Cambridge University Press. 1985. £25.00.

Oxford Illustrated Encyclopedia. Volume 2, The Natural World, edited by **Malcolm Coe**. Pp. vi + 376, with colour and b/w photographs, line drawings, etc. Oxford University Press. 1985. £15.95.

Although superficially covering the same ground, these encyclopedias are actually completely different in approach. Oxford's is, in essence, an illustrated dictionary, traditional in approach, with over 2,500 entries, some cross-referencing but no index. In contrast, Cambridge prefers a subject approach in the form of 15 chapters, equally divided into three parts: process and organization, environments, evolution and the fossil record; in addition, a 20-page classification of living organisms and detailed species and subject indices are provided. Both works are well printed and illustrated, and have been compiled by distinguished biologists. Despite their similar titles, they are aimed at different audiences, the Oxford encyclopedia providing instantaneous answers for the less informed enquirer and the Cambridge volume being more academic in its approach, a textbook rather than a dictionary. Both works represent excellent value for money.

MRDS

God's Acre. The Flowers and Animals of the Parish Churchyard by **Francesca Greenoak**, illustrated by **Clare Roberts**. Pp. 192, with numerous colour illustrations. Orbis. 1985. £12.95.

Churchyards usually represent oases for wildlife in frequently hostile urban and agricultural settings. It is important that their scientific value is recognized. About 20,000 churchyards exist in England and Wales, but the future of an increasing number of them is uncertain, and some maintenance practices have proved deleterious to particular plants and animals. The present work is a timely reminder of the need to protect them. The author has provided a readable and informative text which covers both the history and natural history of these sanctuaries, and the artist has complemented it with a series of delicate, attractive wildlife studies.

MRDS

Manual of Cultivated Broad-leaved Trees and Shrubs. Volume I, A–D. By **Gerd Krüssmann**, translated by **Michael E. Epp**. Pp. iv + 448 (including 329 line drawings), + 176 b/w plates. Batsford. 1985. £40.00.

The first of three volumes of a monumental encyclopedic work which will prove of paramount importance to landscape gardeners, nurserymen, foresters, and botanists in general. When complete, it will cover 5000+ species and 6000+ cultivars in almost 800 genera.

The valuable introduction includes a well thought out guide to terminology and information on hardiness zones. The main body of the text gives comprehensive descriptions of taxa, ably supported by line drawings and photographic plates (those of leaf shapes being particularly successful, some habitat studies less so), with, in some cases, classifications, and keys to species and cultivars; additionally, maps are provided to show the distribution of certain genera and species. Information is also given on plant uses, cultural requirements, and place in landscape and garden design, and many entries include references to other published sources.

The translation from the German original (published 1976) is generally excellent, but it occasionally betrays its origin (eg. retention of Arten, fig. 204); there is also the occasional misprint, the most serious noted being 'Casuarnia' as a major head (p. 293).

This is an indispensable reference work, splendidly produced at a reasonable price.

VAH

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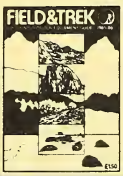

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Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

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FORTY YEARS ON: CHANGES IN NATURAL HISTORY STUDIES SINCE 1945

ROY CROSSLEY

Presidential Address to the Yorkshire Naturalists' Union, Halifax, 7 December 1985

In common with many of my predecessors I consider myself fortunate, and also greatly humbled, to have been offered the Presidential chair of this unique body, the Yorkshire Naturalists' Union, and to be ranked alongside some of the greatest names in Yorkshire natural history. It is a particularly happy chance that this Address is being delivered in Halifax, the town where I was born and brought up, and in whose Scientific Society, our host today, I was encouraged and taught as a youth. It is with pleasure that I am able to acknowledge publicly the debt I owe to the Halifax Scientific Society, and to say that the honour bestowed upon me by the YNU is one that I gladly share with this Society which has meant so much to me over the years.

1985 has been a significant year in our national life, marking as it has done the fortieth anniversary of the end of the Second War. It was early in 1946 that, as a schoolboy ornithologist, I compiled my first diary observations on birds and since then much of my time has been spent in the pursuit of natural history. It seems appropriate, therefore, to review some of the changes that have taken place in natural history studies during the intervening years, from which it may be possible to draw some conclusions to guide us into the future.

Of all the developments of the past forty years, perhaps none has had a more profound influence on our lives than the communications and information explosion. The world has, in truth, become a large village and events in the most remote places of the earth can become instant news to millions. The boundaries of knowledge are being pushed back continually, far beyond what previous generations could have dreamed of, and I am sure that more is still to come. I shall speak later of these things, but for the moment I would like to dwell on some of the events that have taken place in natural history studies in Britain since 1945 and which seem to me to have been of particular significance in influencing our activities.

The first of these was the publication in 1952 of the *Flora of the British Isles* by Clapham, Tutin and Warburg. For about a century, successive generations of botanists had used Bentham and Hooker's *Handbook of the British Flora* to identify plants and, although this well loved work had run to many editions, it had become out of date. The new *Flora* was enthusiastically received; it was followed by other, more 'popular' publications, some with superb colour illustrations. Even so, no serious botanist can afford to ignore 'Clapham, Tutin and Warburg', as it is affectionately known, and it will surely stand as the definitive work until the end of the century and beyond.

The publication of the new *Flora* paved the way for the launching of the distribution maps scheme in 1954 by the Botanical Society of the British Isles, which culminated in the publication of the *Atlas of the British Flora* in 1962. The mapping scheme introduced three concepts: the first harnessed the enthusiasm of amateurs, directing their energies towards a carefully planned cooperative effort in field recording, as had been done before the war in the heron and great crested grebe surveys. The other two new concepts were, first, to make use of the latest data processing methods and information retrieval techniques of modern computers in order to deal with the thousands of records received, and second, to produce maps based upon the presence of species in 10 km × 10 km squares of the National Grid. This was quite revolutionary for, prior to 1954, it had been customary for naturalists to use the vice-county system as the basis for recording purposes. This system, devised by H. C. Watson in 1852, had become unacceptable, because the unit areas were much too large and variable in size to give a valid indication of species distribution on a national scale.

For the first five years the plant mapping scheme was financed jointly by the BSBI and the Nature Conservancy, but thereafter the latter took over the financial responsibility. In 1964 the Biological Records Centre was established at Monks Wood Experimental Station, which had been opened in 1963. As a result of the techniques so successfully pioneered by the plant mapping scheme, the BRC embarked upon a programme of gradual expansion to include other groups of organisms, so that there are now (1985) more than 60 such schemes in operation. In every case where a mapping scheme has been launched, it has acted as a catalyst for specialist naturalists and has additionally produced an upsurge of new interest in those particular organisms. We are currently experiencing this on a national scale in entomology, particularly in respect of flies and beetles, and this is reflected in the recent growth in membership of the Entomological Section of the YNU.

For ornithologists, 1954 was a significant year, with the publication of Peterson, Mountfort and Hollom's *A Field Guide to the Birds of Britain and Europe*. Before its appearance, such pocket identification books as were available were very incomplete or mediocre; the *Field Guide* introduced new techniques of bird identification, developed earlier by Roger Peterson in America. It was an immediate success, setting a standard emulated many times since, and high quality field guides to a wide range of organisms are now available.

At about the same time as the *Field Guide* was published, ornithologists in Britain acquired a novel piece of equipment for trapping birds in connection with ringing operations. This was the nylon mist net, introduced from Japan. Prior to the mist net era, bird catching had been carried out by long-established methods such as Heligoland traps, clap nets and potter traps, mostly bulky to transport, and, in the case of Heligoland traps, permanent fixtures. The mist nets, being light and capable of being rolled up into small packages, made it possible for ringers to take their traps to where the birds were, instead of simply trying to entice them into a trapping area and hoping for the best. Their introduction led to a considerable increase in the number of birds ringed, together with the capture of adults of species such as swallows and martins which had hitherto been ringed principally as nestlings.

A major event occurred in 1958 with the formation of the Council for Nature, devised as a national umbrella body for all natural history interests in Britain. National Nature Week in 1963, the brainchild of the Council for Nature, had a very gratifying response; special postage stamps were issued, there was wide television coverage, and an estimated 400,000 people visited more than 200 events. The County Naturalists' Trust movement gathered momentum during the same period, and by 1964 the network was complete for England, with the exception of Rutland.

In 1966 there was a second National Nature Week, when it was anticipated that in excess of one million people would visit more than 400 events, but by then conservation was beginning to have facets not envisaged by earlier naturalists, seemingly covering anything from the retention of rural bus services to the preservation of ancient buildings. There were no more National Nature Weeks after the extravaganza of 1966; the Council for Nature is now defunct and in its place we have the all-embracing Council for Environmental Conservation. The County Naturalists' Trusts of the 1960s and 1970s have, in some cases, become Trusts for Nature Conservation or Wildlife Trusts, and some people think that by so doing the predominating influence of the naturalists will diminish in these organizations.

In 1966, the Teesdale battle to prevent the construction of a reservoir on a site of major European botanical importance was lost, and it seems to me that it marked a turning point in attitudes amongst both conservationists and developers. Both sides came out of it rather battered and bruised, and since then there appears to have been a greater readiness to compromise than there was in those days. There has not been a similar campaign since, and it could be said to have marked the end of just over a decade of revoution in British natural history. There has been no period to equal it since, and in the future the social historians of natural history will, I suspect, regard the 1950s and 1960s as being the most innovative years of this century.

What an expansion of interest in natural history we have witnessed over the past twenty years or so! I believe that there have been two main reasons for this. The first has been the stimulus resulting from the exposure given to the subject by radio and television. Radio coverage of natural history topics has existed to a certain extent for many years, and older ones amongst us will perhaps recall with affection the lovely voice of Bramwell Evans in the Romany broadcasts on Children's Hour before and during the early years of the Second World War. For many years after the war there was the fine radio magazine programme 'The Naturalist', introduced by Ludwig Koch's evocative recording of the curlew. Output by the Natural History Unit of the BBC doubled between 1970 and 1980, and during 1985 there were more than 110 broadcasting hours put out by the Unit. However, it is television which I believe has had the major impact in bringing the world of nature to the attention of the general public, and it is this medium which has been a prime factor in the communications and information explosion I referred to earlier. In my opinion, it is no coincidence that the increasing availability of colour television has been paralleled by the great increase in public interest in natural history in recent years. During the period 1974 to 1984, colour television licences issued almost trebled to over 15 million and major natural history productions now regularly attract viewing audiences in excess of 10 million. Even if only a small percentage of those viewers are stimulated to become actively interested in the subject, the potential for new recruits to our natural history societies must be considerable.

The second main reason for the increasing interest in natural history has been the growth in the amount of leisure time enjoyed by most people, coupled with a considerable increase in personal spending power, especially since the 1960s. The figures for private car ownership reflect this growth in personal affluence. In 1945 the number of private car registrations was 1.5 million; in 1960 the number was 5.65 million, and this doubled during the next ten years to 11.8 million. The estimated figure for 1985 is 16.75 million and forecasts for private registrations to the end of the century predict in excess of 18 million by the year 2000. As for leisure, trends since the war have been towards a reduction in hours worked generally, coupled with an increase in paid holiday entitlement. For example, the average weekly hours worked in manufacturing industry in 1945 was nearly 47; this had fallen to 45.3 hours in 1960 and to just below 41 in 1984. Forecasts indicate that the figure will be 38 hours per week by the end of this century. Basic holidays with pay for manual workers also illustrate the trend towards increasing leisure. In 1951, for example, 94 per cent of the manual workforce had two weeks, or less, holiday with pay; by 1970, 97 per cent had two or three weeks, and in 1980, only 2 per cent had three weeks, the remainder having more than this, with 55 per cent enjoying between four and five weeks paid holiday. The combination of increasing spending power and more leisure is reflected in the number of holidays taken abroad, which more than doubled between 1971 and 1983, from 7 million to 15 million.

In addition to the greater amount of leisure enjoyed by the working population, there is also the large number of unemployed people with time on their hands. In 1945, 1.4 per cent of the working population was unemployed and the figure was roughly similar in 1960; between 1980 and 1985 the percentage had risen from 5.8 to 11.6 per cent. Forecasts indicate very little change in the situation up to the end of the century, with the figure hovering around 11 per cent (or approximately 3 million people) throughout the 1990s. These figures probably exclude the increasing number of people taking early retirement, although this may only be a temporary trend. More people than ever before have more leisure time, while those who are in employment now have more money with which to enjoy it. The leisure industry is a vigorous area of the economy at a time when many other industries are in decline.

The chief beneficiary of all this, as far as natural history is concerned, has undoubtedly been ornithology, and in this connection it is illuminating to consider the remarkable growth of the Royal Society for the Protection of Birds. In 1939, membership was 4,852 and in 1946 the figure was 6,000; there was a dramatic rise to a membership approaching 66,000 in 1970, followed by a most spectacular increase over the next fifteen years, to the

extent that membership is now in excess of 400,000. These figures do not include relatives of members who supplement the Society's subscription, so total support for the Society is much higher. The junior section of the RSPB has also grown tremendously, rising from 2,000 in 1965 to over 85,000 today. Skilful and highly professional advertising by the Society backed by an efficient administration have no doubt been important contributory factors in its growth, but quite clearly there has been a public ready, willing, and able to respond. Of course, not every member of the RSPB is a bird watcher and many would not claim to be serious ornithologists, while as far as the junior section is concerned, there is inevitably a high turnover as youngsters take up one hobby after another. Nevertheless, the growth has been impressive and it reflects a vast public interest in birds today.

The serious study of birds has not, in fact, attracted the same measure of prolific growth. The British Trust for Ornithology, for example, had a membership in 1945 of 1,215 and this has risen steadily over the years to 7,688 in September 1985. This rate of growth is greater than that of the number of contributors acknowledged in the annual YNU Ornithological Reports. In 1948, 163 people contributed; fifteen years later the 1963 Report acknowledged 267, and in 1983 the number was 326. The later figures may not reveal the whole story as they do not always take into account those individuals reporting through their local bird watching clubs, of which there has been a considerable growth in Yorkshire during the past twenty-five years.

In a significant but less spectacular manner, other groups of animals and plants are attracting growing numbers of enthusiastic students. The national diptera recording schemes now circulate information to over 200 entomologists, of whom a significant proportion are active amateur field workers. Other invertebrate groups are also enjoying increasing popularity; dragonflies are in vogue at the present time, possibly because of their photogenic appeal. Mammals too are increasingly popular subjects for study, especially bats. Recently, bat researchers have acquired a piece of high-tech equipment by means of which the ultra-sonic calls of the animals can be interpreted with sufficient accuracy for many individual species to be identified. Although these, and other, growth areas cannot compare with the increased interest in bird watching they are, nevertheless, indicative of a general trend.

Against this background of general growth, it is pertinent to consider the present position of the Yorkshire Naturalists' Union and its 40 or so constituent Societies. Individual membership of the YNU has had peaks and troughs over the years; in 1955 the YNU had 387 members and five years later this had risen to 455. A high point was reached in 1970 when there were 578 members, but this number had dropped in 1980 to 488 and at present the figure is 495. It can be seen that there is no underlying upward trend in consistent growth, which is contrary to the experience of national organizations, and I suspect that the experience of the YNU is shared by the majority of its Affiliated Societies.

Our traditional local natural history societies in Yorkshire, including the YNU, do not seem to be attracting the potential membership which I believe is available today. There are, of course, a few outstanding exceptions to this generalization and the reasons are probably complex, although much may have to do with the enthusiasm of dedicated individuals amongst the existing membership. Perhaps we should be asking ourselves if the format and organizational structures which have served so well for more than a century are now in need of revision. I know, for example, that the validity of the vice-counties as a recording basis in Yorkshire is being increasingly questioned, bearing in mind that these were abandoned nationally thirty years ago. I suspect that the pattern of activities of the Affiliated Societies differs little from those of forty years ago, with their traditional programmes of winter lectures and summer field excursions. Few hold workshops where the skills and knowledge acquired, often over a lifetime, by the more experienced members can be passed on to those who are just beginning to study natural history. I am sure that much more could be made of this type of activity by the specialist sections of the YNU, to the benefit of both section members and also the members of our Affiliated Societies.

One has also to ask whether the traditional recording areas of many local Societies such as historic parishes, 'ten miles from the centre of the town', and so on, have any real validity today, apart from a certain nostalgic quaintness! Societies which have launched out into corporate local recording schemes based on the National Grid often find that such activities greatly stimulate interest, especially if the results are published. These activities — workshops, identification sessions, local recording schemes and so on — take time and energy to organize, but where there is the determination to change course and to develop members' latent skills more deeply, the results can be quite dramatic, not least in growth of membership. We all know the old adage that nothing succeeds like success, and this is as true of natural history organizations as it is of any human enterprise.

During 1985 I have been privileged to visit about a third of our Affiliated Societies as well as the Union's Sectional meetings and what has impressed me most of all has been the

Members of the Wharfedale Naturalists' Society, seen here watching a wood wasp, on an outing to Simon's Seat near Bolton Abbey in 1947. (Photo: H. Marjoram)

wealth of experience and knowledge that is present in our widespread membership. All over this vast county of York, amateur naturalists are busily working on a wide range of interests, with remarkable success, but this is insufficient to keep our organizations viable in a changing environment. Somehow we will have to attract more people into our Societies and, through them, into the YNU, and encourage them to play an increasingly active part in all our affairs if we are to have the vigorous growth at both local and county level that I believe will be essential for our survival into the next century. I have shown that the potential for exciting growth is all around us; it is up to us all to grasp the opportunities for expansion that are present in society today as never before.

In conclusion, I wish to acknowledge the assistance which I have received in preparing this Address: to officers of the RSPB, BTO, and the BBC Natural History Unit for facts

and figures; to Don Bramley for YNU membership details, and to my bank colleagues for economics statistics. To all these I offer thanks, and it is only right that I should make it clear that the interpretation placed upon the many figures I have been given is entirely my own. Above all I am deeply indebted to my wife for her forbearance and support, not only during my Presidential year, but also through all our years together. How Jean has managed to put up for so long with a self-centred obsessive naturalist I shall never know, but this is a fitting occasion at which to express publicly my heartfelt gratitude for all that she has done to make it possible for me to follow my interests with almost undivided attention for more than thirty years.

BOOK REVIEWS

Yorkshire Mammals edited by **M. J. Delany**. Pp. 256, with 70 figures, 5 tables and plastic overlay. University of Bradford. 1985. £3.95, soft cover.

Country floras and faunas have long been standard features of British natural history literature. At best, mammals have traditionally warranted little more than annotated lists in general county natural histories or vertebrate faunas. Most of these, compiled around the end of the 19th century, are out of date, out of print and long forgotten. The production of a serious book, devoted entirely to the study of mammals on a regional basis, represents a new and exciting development.

Yorkshire and its offshore waters support an impressively rich and diverse mammal fauna, with species ranging in size from the pygmy shrew to the fin whale. Professor Delany has assembled 17 local experts to review all the available data on some 68 species recorded in Yorkshire, resulting in the first comprehensive mammal review since that compiled by Clarke and Roebuck in 1881. Included are studies of polecat and wild cat, now extinct in the county; aliens such as Bennett's wallaby, grey squirrel, mink and sika deer, introduced since the days of Clarke and Roebuck; natives such as serotin bat, mountain hare, grey seal and roe deer, which have colonized, returned or been introduced to the county since 1881. Brandt's bat, discovered new to science in 1970, is known to have been a Yorkshire resident since the 1890s. Yellow-necked mouse, probably long a resident of the county, here receives its first public recognition. The sagas of feral goat, Chinese muntjac deer and Chinese water deer make fascinating reading. A bold move is the recognition of the feral domestic cat as a valid member of our wild fauna. Historical research has contributed greatly to the understanding of past distribution and status of many of the series described and has added the greater horseshoe bat to the county list, thus further extending the known 19th century distribution of this perilously rare species.

Sections on bats and whales are preceded by keys to the identification of species. The review of each species is prefaced by a description, aids to recognition, measurements and field characteristics, followed by fascinating critical studies of distribution past and present, habitat preference, behaviour and biology (breeding, population levels, diet and parasites).

The book makes available a wealth of information gleaned from personal knowledge and widely scattered published and archival sources, ranging from the mainstream of scientific literature to local natural history society minute books, providing in excess of 300 literature references. It also includes an enormous amount of new and hitherto unpublished research, dealing particularly with changes in status, diet and ecological studies. Robert Gillmor's characterful line drawings form an ideal accompaniment to each terrestrial species section.

Records collected by numerous individual enthusiasts and the recorders of a network of local natural history societies have been marshalled by the YNU mammal recorder into tetrad distribution maps. First published in *Naturalist* **108**: 41–82 (1983), these have been updated. A plastic overlay is provided for use with the meticulously prepared maps: the first part shows river systems and altitudes, and the second provides 10 km and 100 km square divisions of the national grid. Though mammals are well recorded in Yorkshire,

the tetrad maps inevitably show 'clumping' of records in areas served by active individuals and societies. This unfortunate bias could perhaps have been used to advantage if the overlays had identified the areas of these society activities for use as sample plots.

For the Yorkshire patriot the book contains a feast of local anecdotes, references to familiar places and people, and complements the current wave of books on Yorkshire flora and fauna. Its importance is not, however, confined merely to parochial or regional interests. Yorkshire occupies such a large part of the north of England and contains such a wide range of zoogeographical zones, habitat types and forms of land use that *Yorkshire Mammals* has implications for the study of the biology, ecology and distribution of mammals throughout Britain.

Bradford University is to be congratulated on publishing an important book, full of fascinating revelations about our native mammals, attractively and informatively illustrated and produced at an amazingly low cost.

The Ecology of Woodland Rodents: Bank Voles and Wood Mice, edited by **J. R. Flowerdew**, **J. Gurnell** and **J. H. W. Gipps**. Pp. xvii + 418, numerous text figures. Symposium of the Zoological Society of London *55*: Clarendon Press, Oxford. 1985. £42.00.

This important and timely symposium volume is essential reading for anyone interested in woodland rodents and woodland ecosystems. Whereas many symposia are loosely related aggregations of the latest research papers of the participants, this is a carefully balanced and carefully contrived sequence of critical review papers. The editors, who organized the original symposium, gave each author a well-defined brief, and the 16 authors have responded brilliantly. The chapter headings give a clear indication of the scope; Berry considers the ecological genetics of Bank Voles and Wood Mice, Clarke reviews their reproductive biology, Gipps discusses behaviour of Bank Voles, as do Montgomery and Gurnell for Wood Mice and Yellow-necked Mice. Stoddart and Sales consider the olfactory and acoustic behaviours of the three species, Hansson their diets, Grodzinski their ecological energetics, Healing and Nowell their parasites and diseases, and King their predators. Spatial distribution and movements are described by Walton and Flowerdew, and two chapters, for bank voles (Alibhai and Gipps) and *Apodemus* (Flowerdew), consider population dynamics. Two more general papers summarise the symposium, one by Stenseth modelling the rodent populations and one by Gurnell considering the position of the three subject species in the wider context of woodland rodent communities.

The emphasis throughout is on studies from Britain and Western Europe; other species of *Clethrionomys* and *Apodemus*, and their analogues like *Peromyscus*, are not generally discussed, not even in the last chapter. There is, however, no shortage of material. All authors are at pains to summarize succinctly what is known in each field, and equally to point out the faults, the dubious assumptions, and the unknowns. It is the combination of compilation and criticism that makes this such a valuable volume. It is certainly an essential reference work for anyone interested in the three subject species, and for any biology library. Even naturalists who can't afford it themselves should make sure they have access to a copy.

DWY

Social Odours in Mammals edited by **R. E. Brown** and **D. W. Macdonald**. 2 vols, pp. x + 506 + 50 and x + 325 + 50, 36 b/w plates, numerous text figures. Clarendon Press, Oxford. 1985. £45.00 & £32.50.

This is a comprehensive review of a somewhat larger subject than its title might suggest. Thirteen authors, who include the two editors, attempt to draw together all that is known about odours, the glands that produce them, and the behaviours and social systems in which they are used, in a systematic, order-by-order, account. There are, effectively, 21

chapters, though the Introduction is not numbered as one of them; 15 are devoted to coverage of one Order each, except that marine mammals (Cetacea, Pinnipedia, Sirenia), subungulates (Hyracoidea, Proboscidea, Tubulidentata) and edentates (Edentata and Pholidota) are grouped, while the Rodentia require three chapters, one for each Suborder. There are also three chapters given to single species 'case studies' (of a tamarin, a tree shrew and humans) while the remaining two chapters review the sources of odours in mammals and the effects of odours on rodent reproductive physiology.

The chapters vary in value, reflecting the level of our knowledge or ignorance. The chapter on edentates is a terse seven pages, which serve to emphasize that we know of the existence of various skin glands, but know next to nothing of the manner or circumstances in which they are used. By contrast, David Macdonald presents a very detailed review of carnivore glands and scent-marking behaviour in 103 pages. This includes an excellent summary of, for example, the paste-marking of hyaenas; what the glands are at anatomical and cytological levels, how their secretions are applied to grass stalks, and where in relation to territory boundaries they are applied. Behavioural experiments, e.g. with Red Foxes, are also fully covered. Even here, the author is at pains to point out how little is known of, for example, scent marking behaviours of mongooses.

One is struck, throughout these volumes, by the contrast between the extensive comparative coverage by the older, anatomical, approach which describes which skin glands are present in which genera, and the modern, intensive, studies of the behaviour of necessarily few species. It is the strength of these volumes that, by their comparative approach and by trying to review all these aspects, they highlight this paradox. As a source to this diverse literature, they will be an essential reference for many years. The fact that the quadruple index of 50 pages (author, common name, scientific name and odour source) is repeated in each volume ensures that the gems which they contain will remain accessible.

DWY

Advances in Animal Conservation, edited by **J. P. Hearn** and **J. K. Hodges**. Pp. xx + 282. Clarendon Press, Oxford, for the Zoological Society of London. 1985. £35.00.

It is fitting that the Zoological Society of London should have organized this symposium in 1984, for over the past twenty years or so zoos have made considerable contributions to the conservation of rare and endangered animals by establishing healthy, properly fed and above all successfully breeding populations, often distributed over several establishments in various parts of the world, and involving close international cooperation. Many illuminating examples of this may be found in the five chapters of the second section of this book ('Conservation in captivity') where various aspects of the care of exotic animals are discussed, including genetical considerations and the impact of disease. This leads on to another five chapters in section three ('Conservation and comparative medicine') which illustrate the extent and depth of the research that is going on in zoos into all aspects of reproduction, to the benefit of rare species and to our own species as well.

The first section ('Conservation in the wild') consists of two 'case histories', and a consideration of the prospects of zoo-bred animals into the wild. The one 'case history' concerns the Antarctic, where international cooperation is essential, and is working fairly well. The destruction of whales is diminishing, but the direct exploitation of the krill on which they feed gives cause for concern. The other is a short account of the remarkable achievements of the government of South Africa in the conservation of threatened ungulate species, and a consideration of the prospects for game-farming.

The final section ('Government and conservation') has chapters on international trade in endangered species (some governments are getting to grips with this better than others), the World Conservation Strategy, 'Conservation and natural resource development' (unhappily but inevitably a gloomy contribution) and Lord Zuckerman's concluding remarks in which he highlights the scientific work of the Zoological Society of London.

FHB

NOTES ON THE KESTREL POPULATION OF SNOWDONIA, NORTH WALES

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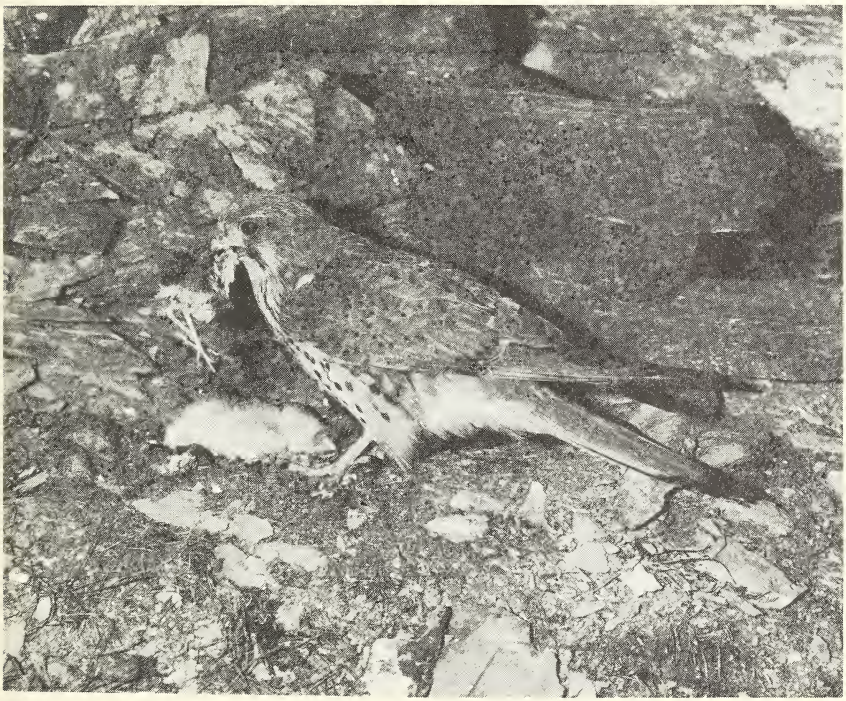
The Kestrel *Falco tinnunculus* is the most widespread and numerous raptor in Britain according to the BTO survey of breeding birds (Sharrock 1976). It breeds in a wide range of habitats, from upland to urban, and numbers are well known to vary annually in some regions in relation to the abundance of voles, notably *Microtus agrestis*. In a review of 30 published estimates of Kestrel breeding densities in Europe, Village (1984) drew attention to problems of making a census of this falcon and cast doubt on the validity of many of the results. Problems can arise from the sometimes clumped distribution of nests, especially



Kestrel in a disused moorland quarry in North Wales (June 1980): cock bird with unidentified fledgling ready to feed 1 to 2 day-old chicks. (Photo: R. H. Fisher)

where nest sites are scarce, and from shared feeding ranges, as well as from biases caused by season of survey and size of census area. Thus, apparent breeding density was found to be negatively correlated with size of survey area. Of 14 British censuses included in the above review, only three were for upland Kestrel populations, and all referred to grass and heather moorlands in Scotland. It seems therefore worth presenting here some observations on the breeding season abundance of Kestrels in a mountainous region of Wales, despite the potential problems with assessing numbers of this species.

Methods

Observations on Kestrels were made in 1979–1982 during the course of annual surveys of the breeding populations of Raven *Corvus corax*, Buzzard *Buteo buteo* and Peregrine *F. peregrinus* in the 926 km^2 of Snowdonia which lies west of the Conwy valley and north of the Vale of Ffestiniog. The study area (Fig 1) is dominated by rugged mountain ranges separated by deep glaciated valley systems; 85 per cent of the area is above 150 m, which rises to 1,085 m above sea level. Annual precipitation exceeds 1,500 mm over 90 per cent of the area, and reaches around 2,500 mm in the central massifs. The land-use is predominantly high-rainfall, montane acidic grassland (sheepwalk) with tracts of heather moorland and, at lower levels, remnant deciduous woods, several extensive and dense coniferous forests (9 per cent of the area), scrub, and enclosed pastures.

From March to July inclusive each year, approximately 500 hours were spent in the field. All sightings of Kestrels and their activities were recorded during repeated searches of the various habitats and localities throughout the study area.

Additional information was provided by other resident observers. From the geographical and temporal pattern of sightings, the distribution of confirmed breeders and of probable and possible breeding birds was mapped. Probable breeders were pairs observed prospecting, courting or mating at suitable sites in April, as well as others mobbing Buzzards near cliffs in June. Possible pairs relate to localities where only single Kestrels were observed in suitable nesting terrain, though usually on more than one occasion in a season, or in more than one year. No special effort was made to locate all nests, the main emphasis of field work being carried out on the other three species mentioned above.

Results

Records of Kestrels in the breeding season were scattered rather sparsely but fairly evenly throughout the valleys and lower mountain slopes though, in fine weather at least, some birds foraged up the steep mountain-sides to above 750 m elevation (Fig 1). Table 1 summarizes the numbers of actual (minimum) and presumed or possible (maximum) pairs located in Snowdonia and for each of its four sub-areas as demarcated by mountain blocks

TABLE 1

Estimated breeding season numbers and densities of Kestrels in Snowdonia, 1979–82

Sub-area	Area (km^2)	No. Pairs Estimated Minimum	Maximum	Density (pairs/100 km^2) Minimum	Maximum
Carneddau (north)	251	10	16	4.0	6.4
Central	201	5	12	2.5	6.0
South-west	176	13	19	7.4	10.8
South-east	298	5	17	1.7	5.7
	926	33	64	3.6	6.9

Notes:

1. Minimum pairs refers to pairs observed courting, prospecting nest sites or confirmed as breeding; maximum pairs include those deduced from sightings of single birds in suitable breeding habitats during March–July.
2. The 4 sub-areas are: (i) Carneddau — northernmost mountain range; (ii) Central — Glyder and Snowdon (Yr Wyddfa) massifs; (iii) South-west — ranges west of Aberglaslyn — Waunfawr pass; (iv) South-east — ranges between Nantgwynant and R. Conwy.

FIGURE 1

Topographical map of Snowdonia study area showing major habitats and the distribution of Kestrel records during the breeding seasons, 1979–82. Filled circles denote located nests, half-filled circles mark pairs observed at probable nest sites, and open circles show localities where only single birds were observed. The area boundary is indicated by dashed or dash-dot lines, and boundaries between sub-areas by dotted lines. Rivers are not shown below the 150 m contour.

and passes. The records suggest that the total population was likely to have been between 33 and 64 pairs, implying an overall density of between 3.6 and 6.9 pairs/100 km^2. However, as these values are derived from aggregated records, the numbers present in a given year might have been somewhat lower. On the other hand, in most Kestrel localities birds were seen in more than one year, and in some every year. Observed densities were highest in the south-western sub-area (7.4–10.8 pairs/100 km^2), and lowest in the south-east (1.7–5.7 pairs/100 km^2). The former sub-area contained the highest proportion (30 per cent) of enclosed pastures, whereas the latter was the most densely afforested (20 per cent cover). The above estimates should be regarded as preliminary and a basis for more detailed study in the future. Casual observations since 1982 suggest that Kestrel numbers in Snowdonia are more or less stable, although there appears to be sufficient habitat for a further 20–25 pairs, i.e. a potential density of around 9 pairs/100 km^2.

Table 2 compares the deduced number of Kestrel pairs with the number of Buzzard pairs determined by complete census (Dare *in prep.*); it also summarizes the relative frequencies with which adult Kestrels, Peregrines and Buzzards were seen from mid-March to mid-July in 1980 and 1981. In Snowdonia overall, Buzzard pairs outnumbered Kestrels by a factor of between 1.4 and 2.7. However, in the south-western sub-area, where Kestrel density was relatively high (Table 1), roughly equal numbers of the two raptors nested.

TABLE 2

The abundance of Kestrels relative to other raptors in Snowdonia as indicated by the ratios of: (a) the numbers of pairs located, (b) the numbers of adults seen in the breeding season

	Kestrel		Peregrine		Buzzard
(a) ratio of pairs	1	:		:	1.4–2.7
(b) adult sightings per day	1	:	0.5	:	6.6

Notes:

1. Buzzard pairs censused accurately (Dare *in prep.*); Peregrine data not available for publication.
2. Adult sightings refer to a *ca.* 10 hour field-day, are averaged over the 1980 and 1981 breeding seasons (mid-March to mid-July), and exclude Buzzards flushed from nests during routine nest inspections.

There was no suspicion that two or more Kestrel pairs might be aggregated in any locality. Indeed, birds generally appeared to be so thinly spread that Kestrel sightings per day were always exceeded greatly by Buzzard sightings (Table 2), and on two occasions even by those of Peregrine. It should be stressed, however, that sighting frequencies do not necessarily afford an accurate index of relative abundance, partly due to weather influences, and especially to interspecific differences in diurnal and seasonal activity patterns. Neverthless, the sightings ratios in Table 2 confirm suggestions of low Kestrel density in Snowdonia.

Breeding was confirmed in 16 localities and 10 nests were found. In south-west Snowdonia, six nest sites were spaced from 2.1 to 4.0 km apart. Observed nests were all between 105 m and 410 m above sea level, but the highest observed pairs probably bred at around 450 m. In Britain, almost all Kestrel nests are below 480 m (Cramp and Simmons 1979); approximately 25 per cent of the Snowdonia study area lies above this altitude (Fig 1). Most Kestrels probably nested on crags and vegetated bluffs, even where mature trees and old corvid nests were plentiful. Of the ten nests found, seven were on natural rock faces (including four in disused nests of Ravens) and three were in abandoned slate quarries (one in the old nest of a Buzzard). By contrast, east of the Conwy river (outside

the study area), and in a region of upland sheep and cattle farms and extensive moors with few cliffs and quarries, Kestrels were found to nest chiefly in trees. Here they occupied tree holes as well as old nests of Carrion Crow *C. corone* and Magpie *Pica pica*, but some utilized the only available quarries in addition to several disused crag nests of Raven and Buzzard.

Discussion

The previously reported densities of breeding Kestrels in upland Britain (Scotland) range from 7 pairs/100 km^2 in Speyside (Macmillan 1969) to 42 pairs/100 km^2 in Dumfries during a year of high vole abundance (Picozzi and Hewson 1970). Under presumably more normal food conditions in Dumfries, Village (1984) reported 27 pairs/100 km^2. In the cultivated lowlands of southern and eastern England since 1960, densities of 4–27 pairs/100 km^2 have been estimated (review by Village 1984). The deduced density in Snowdonia (3.6–6.9 pairs/100 km^2) thus falls at the lower end of the range for British Kestrels, while that in south-west Snowdonia (7.4–10.8 pairs/100 km^2) was similar to the Speyside density. The Snowdonia values also lie close to the regression line of apparent breeding density on study area size calculated by Village (1984).

Brown (1976) stated that there are very large tracts of moorland and mountains in Scotland and elsewhere where the Kestrel is relatively rare, partly because of lack of suitable nesting sites. In Snowdonia, however, where a shortage of sites for such a versatile nester seems unlikely, Kestrels nevertheless were outnumbered by the much larger and equally adaptable Buzzard with 12–13 pairs/100 km^2 (Table 2; Dare *in prep.*). A similar situation was noted on Dartmoor where 39 km^2 of upland farms and moorland held 10–15 pairs of tree-nesting Buzzards but only 1–5 pairs of Kestrels over a 12-year period (Dare and Hamilton 1968). The comparative scarcity of Kestrels in prime Buzzard country in Snowdonia, as on Dartmoor, may conceivably reflect competition with Buzzards for small mammal food resources. In these two regions, both raptors routinely hunt open terrain by hovering or from perches, and both take small rodents and shrews *Sorex* spp. as principal prey, as well as amphibians, lizards *Lacerta vivipara* and small birds (Dare 1961 and *in prep.*).

Immature Kestrels have been recorded as prey at Buzzard nests in Snowdonia (Dare *in prep.*) and mid-Wales (P. E. Davis *pers. comm.*). It may therefore be relevant that breeding Kestrels in Snowdonia rarely shared large and otherwise suitable cliffs with nesting Buzzards, whereas Peregrines and Ravens both did so in several places. Further, the recently increased population of Peregrines in Snowdonia could be excluding Kestrels from some nest cliffs.

Summary

The breeding population of Kestrels in 926 km^2 of predominantly mountainous terrain during 1979–1982 is estimated to have been 33–64 pairs, at an average density in the range 3.6–6.9 pairs/100 km^2. This result is near the lower end of the recorded range for this species in Britain.

Breeding was restricted mainly to below 450 m altitude, and most pairs probably nested on crags and in disused quarries where old nests of Raven and Buzzard were also utilized on occasions. The possibility that low Kestrel density might have been due in part to competition for food with more abundant Buzzards is discussed.

Acknowledgements

I wish to thank the following observers who provided local information: J. C. Barnes, B. Boothroyd, J. Driver, G. Jones-Ellis, R. H. Fisher, G. Parry and G. Roberts.

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BOOK REVIEWS

The Oxford Book of British Bird Names by **W. B. Lockwood**. Pp. 174. Oxford University Press. 1984. £7.95.

This most interesting and useful volume consists of an alphabetical list of the English names of British birds and their etymological origins. It is simply that, but a most revealing book nevertheless. How often does one wonder why on earth a certain species has such a strange name? Here are the answers, and some are not always what one would expect. In addition to explaining the local vernacular names, such as Joe Benn (Marsh Tit) and Pick Tarnie (Common or Arctic Tern), it tells us the origins of the accepted names such as Blackbird — a name that could only have applied to a small bird in the 15th century when it was first used, as larger birds such as crows were called jowls.

Do you know, for instance, what a Poke Pudding is? Buy this book and all will be revealed.

Coastal Waders and Wildfowl in Winter, edited by **P. R. Evans**, **J. D. Goss-Custard** and **W. G. Hale** for the British Ornithologists' Union. Pp. 331. Cambridge University Press, Cambridge. 1984. £27.50.

This work is based on the contributions for a conference in 1981 and as the editors say, '. . . this book will be of value to students of animal ecology and behaviour as well as to ornithologists interested in the conservation of birds in coastal habitats . . .'

The three main sections, The influence of food resources on the use of feeding areas, Social behaviour and the use of feeding areas, and The significance of specified areas in the Palearctic-African migration routes of waders, are packed with the results of solid research and have lengthy reference lists. Most of the intensive studies carried out on this large group of birds in recent years, much of it with a view to assessing the need for conservation, is here. A book for the specialist or wader enthusiast and expensive.

Robins by **Chris Mead**; illustrated by Kevin Baker. Pp. 128. Whittet Books, London. 1984. £4.95.

An interesting production for those who want to learn most of what is known about our national bird. There are no fewer than 53 chapters, ranging from migration to how to breed mealworms!

The style attempts a little humour from time to time but the more serious chapters are sound and include distribution, habitat, plumage, moult, display and song.

The whole is a collection of available data rather than the results of a special study by the author. There are, inevitably, a few anomalies and omissions but it is a 'nice little book' and worth the price.

JRM

AMBLYGAMASUS DENTIPES (C. L. KOCH) (MESOSTIGMATA: PARASITIDAE), A TERRESTRIAL MITE NEW TO THE BRITISH ISLES

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In March 1984 Mr Julian Dison, a biology student at the University of York, asked me to identify four specimens of a large parasitid mite. His work involved predator-prey studies of Mesostigmata and Collembola on rough pasture in the Yorkshire Wolds and most of the time he had been working with a well-known parasitid, *Pergamasus longicornis* (Berlese) (Dison 1984).

I identified Mr Dison's specimens (2♂♂, 2♀♀) as *Amblygamasus dentipes* (C. L. Koch, 1839) which was described originally from Regensburg in Bavaria, southern Germany. Since then it has only been recorded from Holland (Oudemans 1902, 1926), Austria (Irk, 1947), Switzerland (Schweizer 1961) and France (Athias-Henriot 1967). Turk (1953) listed this species in his 'Synonymic Catalogue of British Acari', but Bhattacharyya (1963) was unable to find authentic British specimens. Recent correspondence with Dr F. A. Turk has revealed that in about 1944 or 1945 he had borrowed from the Rev. J. E. Hull a thick typescript, compiled *c.* 1937–8, in which Hull identified *Amblygamasus dentipes* in a tube of material sent to him by William Falconer and collected at Marsh Cote, Harden, Yorkshire by a Mr W. P. Winter in 1921. There is in the Hull Collection in the British Museum (Natural History) a single female 'Parasitid: W. P. Winter' without further data which on examination is probably *Paragamasus runciger* (Berlese), a common British species.

Dr Turk also recalls identifying *Amblygamasus dentipes* among slides of Acari sent to him by Harry Britten senior, probably in the early 1950s. This recollection is strengthened by the fact that Dr Turk's working copy of his 'Synonymic Catalogue' has the letters 'H. B.' against this species. However, re-examination of both the Harry Britten material in Manchester Museum (including a recent computer printout of the collection) and the C. D. Radford collection, has failed to locate this material. Dr Turk further recollects that he identified *Amblygamasus dentipes* amongst slides sent to him by Eugene O'Mahony of Dublin. However, no such slides can be located at present in the National Museum of Ireland in Dublin (Dr J. P. O'Connor, *in litt.*) where they were allegedly deposited.

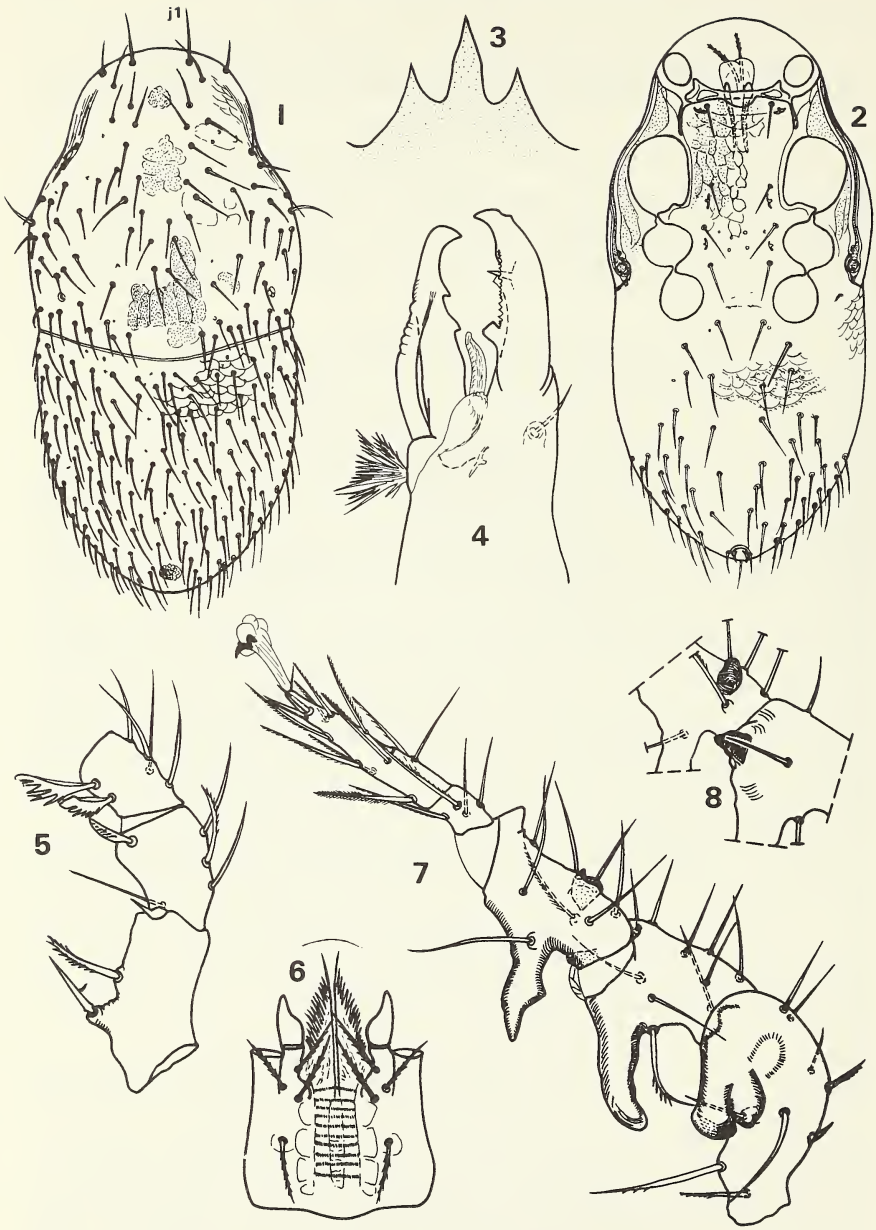
Thus, there is no proof that this species has been authentically recorded from the British Isles and the present material may constitute the first confirmed record.

Amblygamasus dentipes (C. L. Koch)

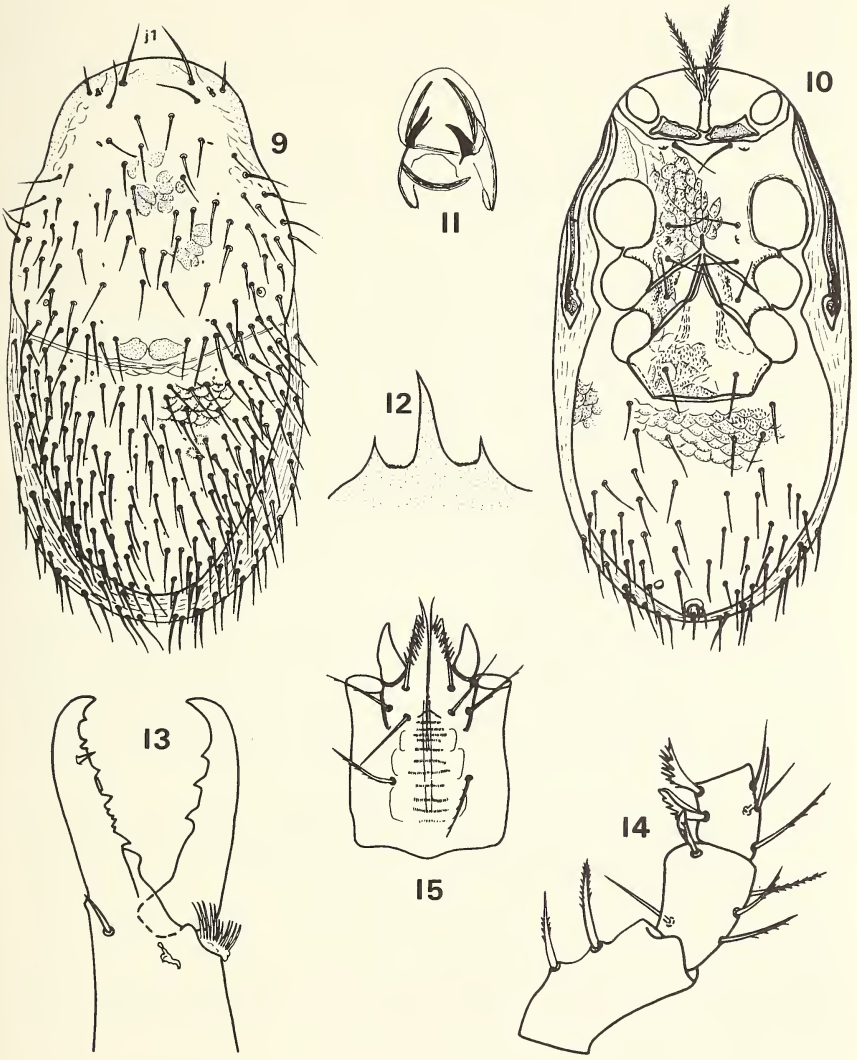
Gamasus dentipes C. L. Koch, 1839: 26, Taf. 1.
Gamasus (Amblygamasus) dentipes: Berlese, 1906: 187.
Porrhostaspis dentipes: Müller, 1860: 177.
Parasitus dentipes: Oudemans, 1902: 38.
Pergamasus dentipes: Micherdzinski, 1969: 332. Karg, 1971: 389, 412.
Pergamasus hamatus var. *longipes* Schweizer, 1961: 62 **Syn. nov.***, syntype from Birsfelden examined.
Amblygamasus basileus Schweizer, 1961: 70. **Syn. nov.***†

* Athias-Henriot (1967) suggested that these two taxa might be synonyms of *dentipes*.

† Micherdzinski (1969) included *basileus* in the synonymy of *dentipes*, but stated that it would be necessary to examine the types to be certain. However, I am informed by Dr C. Bader that Schweizer made only glycerine preparations of some of his material and that much of it, including the type of *basileus*, could not be salvaged. In the absence of evidence to the contrary I have followed Micherdzinski and consider *basileus* to be a synonym of *dentipes*.



FIGURES 1–8: *Amblygamasus dentipes* (C. L. Koch), **male**, 1, dorsum; 2, venter; 3, tectum; 4, chelicera; 5, palp trochanter, femur and genu; 6, venter of gnathosoma; 7, leg II, entire; 8, leg II, reverse side of part of genu and tibia.



FIGURES 9–15: *Amblygamasus dentipes* (C. L. Koch), **female**, 9, dorsum; 10, venter; 11, endogynium; 12, tectum; 13, chelicera; 14, palp trochanter, femur and genu; 15, venter of gnathosoma.

IMMATURE STAGES.
Unknown

MALE. Idiosoma 1,160 μm long × 600 μm wide in both Yorkshire specimens, strongly sclerotized, completely divided dorsally by a median incision, entirely reticulated in posterior half, almost devoid of reticulations in anterior half (Fig 1). Podonotal region with *c.* 41 pairs of simple setae not arranged symmetrically, setae *j1* the longest (*c.* 110 μm). Opisthonotal region with up to 76 pairs of simple setae measuring 85–100 μm in length.

Tritosternum with short, narrow base and paired pilose laciniae (Fig 2). Ventral region covered by a reticulated holoventral shield. Dorsal median division continuing ventrally to posterior of stigma. All setae simple, slender. Sternal setae *c.* 85 μm in length, median opisthogastric setae *c.* 105 μm, postanal seta *c.* 1.5 times the length of paranal seta. Peritreme finely granular, extending to level of coxa I.

Tectum (Fig 3) granular, with three prominent spines, median one longest. Chelicera (Fig 4) with movable digit 195 μm and bearing two prominent teeth, fixed digit with prominent pointed tooth adjacent to the *pilus dentilis* and with about sixteen very small teeth in a single row ending in a large squarish forward-pointing tooth basally. Chaetotaxy of palp trochanter, femur and genu as in figure 5; trochanter with posterolateral seta spinelike, arising from a conspicuous eminence, anterolateral seta stout, pilose; femur with anterolateral seta spatulate; genu with both anterolateral setae strongly pectinate. Venter of gnathosoma as in figure 6; corniculi strong, conspicuously swollen basally, all setae slender and finely pectinate, ten to eleven rows of hypognathal denticles discernible. Legs with setae generally slender and mainly simple. Leg II shown in detail in figures 7 and 8; femur, genu and tibia with strong, backward-directed, ventral spurs as follows: that on femur deeply incised and swollen, on genu curved and thumblike, on tibia swollen medially and tapering distally; genu and tibia additionally with conspicuous, short, strong dorsal and lateral spurs as figured.

FEMALE. Dorsal shield (1,170 μm long × 635 μm wide in the figured specimen, 1,150 μm × 610 μm in the second specimen) entire, strongly sclerotized and, like the male, entirely reticulated in posterior half, but almost devoid of reticulations in anterior half (Fig 9). Podonotal region with up to *c.* 43 pairs of simple setae arranged fairly symmetrically; setae *j1* longest, *c.* 112 μm. Opisthonotal region with up to *c.* 63 pairs of simple setae, surrounding membrane with about 25 pairs of simple setae measuring up to almost 120 μm.

Tritosternum with long narrow base and pilose laciniae (Fig 10). Presternal shields strong, trapezoidal, granular. Sternal, metasternal and genital shields strongly sclerotized, reticulated and granular. Sternal shield with median incision on posterior margin, reticulations radiating from the incision. Endopodal shields fused with metasternal shields to form strongly sclerotized borders. Genital shield strongly outlined and pentagonal, broadly pointed anteriorly. The endogynium distorts easily, but its principal features are shown in figure 11. Opisthogastric shield with *c.* 20 pairs of setae, surrounding membrane with just a few pairs on ventral side and close to the shield. All ventral setae, except anals, *c.* 100 μm in length, slender and simple. Paranal setae *c.* 40 μm, postanal seta *c.* 56 μm. Peritreme finely granular, extending anteriorly to level of coxa I; peritrematic shield free from holodorsal shield posteriorly.

Tectum (Fig 12) trispinate, centre spine more slender than in the male, lateral spines shorter. In the figured female there are small fine teeth between the centre and outer spines. Chelicera as in figure 13; fixed digit with about six distinct plain teeth and in its basal half a 3–4 cusped irregular tooth; movable digit *c.* 230 μm, with three distinct large teeth. Chaetotaxy of palp trochanter, femur and genu as in figure 14; both setae of trochanter stout, posterolateral faintly pilose, anterolateral strongly pilose; femur with anterolateral seta spatulate; genu with both anterolateral setae strongly pectinate, similar to the male. Venter of gnathosoma as in figure 15; corniculi strong, not swollen basally, all

setae slender, only external posterior hypostomatics and palpcoxals with fine pectinations; about twelve rows of hypognathal denticles. Legs with all setae slender, some mainly ventral setae pilose, remainder simple.

MATERIAL. Two males and two females collected by Mr J. Dison from rough, calcareous pasture at Givendale (SE 814537), East Yorkshire Wolds, Humberside, during November 1983.

Acknowledgements

I thank Mr J. Dison for sending the specimens to me and Dr M. B. Usher for his comments on the manuscript. Dr C. Bader (Basel) kindly lent a syntype slide of *Pergamasus hamatus* var. *longipes* and also Schweizer's original drawings and notes of both *longipes* and *Amblygamasus basileus*.

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NATURALISTS ON HATFIELD MOOR: FURTHER NOTES

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In a recent paper on Hatfield Moor (Limbert 1985), details were given of a visit made to several parts of the Doncaster district by J. C. Dale *et al.* in 1837, probably at the invitation of Dale's lifelong friend, the Rev. F. O. Morris, who was then assistant curate of Armthorpe and Christ Church, Doncaster (Morris 1897). During the 1837 excursions, Hatfield Moor was visited on 25 July. As it is unlikely that Dale *et al.* were invited to unknown and unworked sites, this implies a local familiarity with Hatfield Moor. In

support of this, I have since discovered that Morris possessed at least some knowledge of the Hatfield Chase region, of which Hatfield Moor is a part. In a general account of the chase, published in 1837, Morris remarked:

> 'I have travelled much, both in England and Ireland, but never did I before behold so strange and anomalous a region. The naturalist will visit "the Level of Hatfield Chase" with a spirit of enquiry, at least such was my case, for I had heard so much of the mystery in which its history is involved that I embraced the first opportunity of accompanying a friend who had greatly excited my curiosity by his description of the country.'

The 1837 record of *Nomada leucophthalma* (Kirby) from Hatfield Moor, contained in the C. W. Dale manuscript catalogue of the Dale Collection, is actually based on a misidentified specimen. I am grateful to Dr M. E. Archer for pointing out that the relevant specimen is an example of *N. obtusifrons* Nyl.

I surmised that the first entomologists to encounter Large Heath *Coenonympha tullia* Müll. on Hatfield Moor were probably J. R. Hawley and Edwin Birchall. However, F. O. Morris presumably noted the insect during his Doncaster years, though there is admittedly no available evidence for this. Equally likely, the Doncaster taxidermist and natural history dealer Hugh Reid located the species on the moorland. He came to Doncaster *c.* 1812, and remained until his death in 1863. He was interested in ornithology as well as Lepidoptera, and for example proved Black-tailed Godwit *Limosa limosa* (L.) to breed on Hatfield Moor. I have no date for the latter, but it seems to have occurred sometime before 1829 (cf. Witherby *et al.* 1940), and thus Reid probably also encountered *Coenonympha tullia* before that year.

Samuel Hudson, a 'labouring man naturalist' (Anon. 1904), perhaps best known as the chronicler of Mazarine Blue *Cyaniris semiargus* Rott. at Epworth, just to the west of Hatfield Moor, visited the latter site for *Coenonympha tullia* in the 1860s, and possibly earlier. In the *Zoologist* for 1864, Hudson described the eggs and larvae of the butterfly from Hatfield specimens, which he fed on *Rhynchospora alba* (L.) Vahl from that moorland. According to Barrett (1893), Hudson 'appears to have been the first in this country to notice the preparatory stages of this insect', though this statement is not entirely accurate (e.g. Chappell 1856).

Acknowledgements

I am grateful to T. M. Melling, W. E. Rimington and Dr M. E. Archer for information supplied.

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THE INTRODUCTION, SPREAD AND CURRENT DISTRIBUTION OF *RHODODENDRON PONTICUM* IN THE PEAK DISTRICT AND SHEFFIELD AREA

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Introduction

As an invasive alien, the status and spread of *Rhododendron ponticum* has been studied at a number of individual sites within the British Isles (Cross 1973, 1981; Robinson 1971, 1980; Fuller and Boorman 1977). Its spread over the country as a whole has been considered by Brown (1953a, 1953b), Elton (1958) and Cross (1975).

The introduction, spread and current distribution of the plant within the Peak District and surrounding areas has received little attention. *R. ponticum* was not mentioned in the floras of Lees (1888), Linton (1903) or Moss (1913). The first reference in local or regional floras is in the *Flora of Derbyshire* (Clapham 1969), which states that *R. ponticum* is an introduced species often planted in woods and elsewhere, spreading freely on suitably moist, acid soils, both under shade and in the open. It is described as being locally abundant. A number of sites are recorded on soil derived from both the Millstone Grit and Coal Measures Series (Upper Derwent Dale (SK19); Taxal (SK0080); Blacka Moor (SK2880); Buxton (SK07); Grindleford (SK2778); Rowsley (SK2865); Beauchief (SK3381); Cordwell (SK3076); Ogston (SK3759). There is also one record on the Carboniferous Limestone at Fenny Bentley (SK1750). (Some of these records, for example that at Grindleford (SK2778), may be inaccurate.) Further records in the *Supplement to Flora of Derbyshire, 1974–1979* (Hollick and Patrick 1980) include one for Lathkill Dale (SK16), also on the Carboniferous Limestone.

According to Anderson and Shimwell (1981), *R. ponticum* was planted in some early coniferous plantations which were established as coverts. They note that it is locally dominant in the Chunal Plantation south of Glossop, in plantings at the southern end of Beeley Moor and around Park Hall in Little Hayfield. At this latter site it is invading the adjacent heather moorland. It is also noted as a prominent component of some mixed and deciduous plantations, as in Lyme Park, Disley. Anderson and Shimwell describe the Errwood Hall woodlands as being the home of *Rhododendron* in the Peak District, with some 40,000 specimens being planted there in the 1850s.

A major difficulty in tracing the introduction and spread of *R. ponticum* is that because of its alien status, botanists have tended to neglect it — even though considerably rarer exotics may be recorded. It is also frequently absent from records of gardens and estates since it was the 'common rhododendron' and perhaps not worthy of note, despite being planted on a massive scale.

Piecing together the picture of the introduction and spread of *R. ponticum* in the Peak District and Sheffield area must, therefore, rely on currently extractable information.

Method

Firstly, a survey was carried out to establish the present distribution on a 1 km × 1 km square basis (Fig 1). Areas were visited and numerous appeals for information were made to local naturalists, landowners and the general public. The response was good and many squares with naturalized *R. ponticum* were found. Aerial photographs of the area were also examined. Secondly, sites of known or suspected introduction were identified. Where possible, information was obtained from landowners, local library archives or other data sources, concerning dates and reasons for introduction. Thirdly, a general survey of relevant local natural history publications and other literature supplemented the above.

Records were collected over the period 1979–84.

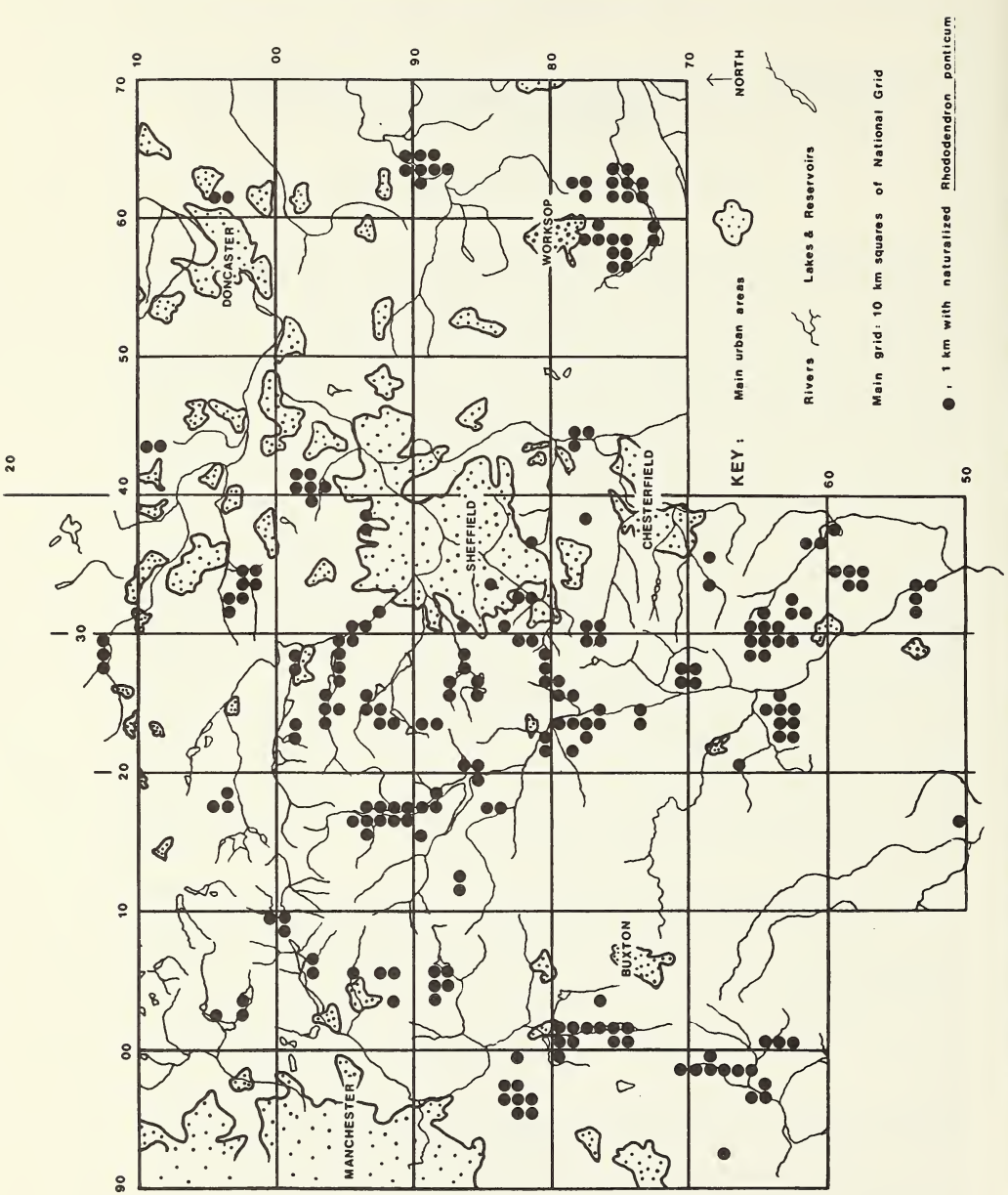

FIGURE 1 The distribution of *Rhododendron ponticum* in the Peak District and Sheffield area

Results

Known sites and dates of introduction of *R. ponticum* are presented in Table 1. The earliest records of introduction in this area are from around 1830 on the major estates such as Chatsworth (in the east of the Peak District) and Errwood (in the west). These were as part of large scale landscaping schemes for gardens and estates and presumably as cover for game. Alderwasley Hall (in the east) and Lyme Park (in the west) may have followed relatively close behind, sometime between 1850 and 1890.

The first known introduction in Sheffield was by the Wilsons at Beauchief, between 1850 and 1870. The same family was responsible for introductions to Ecclesall Woods (*c.* 1870), Cordwell (*c.* 1870–1890) and Upper Derwent Dale (*c.* 1900). The Wilsons were also responsible via friends or relatives for the introduction of *R. ponticum* to numerous sites throughout the area east of the Peak and west or north of Sheffield (e.g. Broomhead Hall, Fairthorn Lodge, Sugworth Hall, Sydnope Hall and, possibly, Ogston Hall, all *c.* 1900). All these were primarily for wildlife cover, although it seems likely that in exposed sites such as Broomhead they may also have served as wind-breaks.

The period 1890–1900 also saw introductions taking place to the south-east of Sheffield at Renishaw and to the north-west of Sheffield at Strawberry Lee Plantation and Longshaw, primarily for ornament but at Strawberry Lee, also probably as a shelter-belt. By the turn of the century, *R. ponticum* had already been introduced to many of the sites from which it has since spread, with subsequent main introductions on estates to the east of Sheffield during the period 1920–1930. These were primarily for game cover. Figure 1 shows the current distribution of *R. ponticum* in the Peak District and Sheffield area.

Discussion

The present distribution reflects the pattern of introduction, the suitability of habitats and the degree of management employed. A major factor limiting the spread of *R. ponticum* is the availability of suitable sites for seedling germination and survival. Relatively open, moss-covered ground and humid conditions are essential (Cross 1973). Disturbance of vegetation and soil by forestry management, grazing animals, or other events such as moorland fires, appear to considerably increase the availability of such sites. This supports similar findings of Fuller and Boorman (1977) and Cross (1981).

At sites where such disturbance occurs, *R. ponticum* actively invades surrounding vegetation such as woodland (e.g. Chatsworth), moorland (e.g. Hallam Moor (SK2686), Blacka Moor (SK2880), Broomhead Moor, Park Hall, Stanton Moor) or rough grassland (e.g. Ewden Valley below Broomhead Hall, Cordwell, Matlock Forest near Sydnope Hall).

At sites which are less disturbed, spread is by vegetative means, with apparently restricted regeneration from seed. Examples of this are Ladies Spring Wood (near Beauchief Hall) and Strawberry Lee Plantation. In the latter case, no seedlings or young bushes were found in the central, more open area of the wood, the only spread apparently being vegetative from the original planting around the perimeter. Spread by seed is occurring on the adjacent heather moor, as shown by two small *R. ponticum* bushes presumably originating from wind-blown seed.

Spread may occur over distances up to at least 1 km from the original site. This is probably as a result of dispersal of the very small seeds (1000 seeds weigh *c.* 60 mg — Brown 1953a) which are produced in profusion (*c.* 1 million by a bush 2 m high and 10 m circumference — Brown 1953a) and can be carried over considerable distances by the strong winds which characterize the Peak District uplands.

Some control and eradication work is now being carried out, either by the Forestry Commission or with the aid of conservation volunteers at sites owned by the National Trust or private estates such as Chatsworth. However, such attempts are expensive, labour intensive, and largely unsuccessful since *R. ponticum* is very resistant to most herbicides and, even after treatment, still requires physical removal of dead material. The overall effect is to cause severe damage to soil, other vegetation and, in some cases, to

TABLE 1

Introduction of *Rhododendron ponticum*

Site	Grid Ref	Estate	Date	Reason	Information Source
Alderwasley Hall	SK3253	Hurt	*c.* 1850?	?	Mrs B. W. Brook, Alderwasley Hall
Beauchief Hall	SK3281	Wilson	1850–1870	Wildlife Cover/Ornament	Miss E. Wilson
Broomhead Hall	SK2496	(Wilson)	*c.* 1900	Wildlife Cover/Ornament	Miss E. Wilson
Bradfield/Strines	SK2492	Fitzwilliam	*c.* 1920	Game Cover	Mr G. J. R. Broadhead, Fitzwilliam Estates
Chatsworth	SK2670	Devonshire	1830–1840	Game Cover/Ornament	Mr M. Pearman, Chatsworth Estate
Clumber	SK6375	Newcastle	1920–1930	Game/Wildlife Cover	National Trust
Cordwell	SK3077	Wilson	1870–1890	Wildlife Cover/Ornament	Miss E. Wilson
Ecclesall Woods	SK3282	Wilson/ Fitzwilliam	*c.* 1870	Wildlife Cover/Ornament	Miss E. Wilson
Errwood Hall	SK0074	Grimshawes	*c.* 1830–1850	?	Mr J. B. Kingsmill, Forestry Commission
Fairthorn Lodge	SK2585	(Wilson)	*c.* 1900	Wildlife Cover/Ornament	Miss E. Wilson
Kinder Reservoir	SK0588	?	Late 1800s?	Landscaping around reservoir	Mr B. P. Annikin, N.W. Water Authority
Longdendale	SK0899	Tollemache	?	Game Cover	N.W. Water Authority
Longshaw	SK2679	Rutland	*c.* 1890	Ornament	National Trust
Lyme Park	SK9682	Newton	Late 1800s	Rhododendron Collection	Mrs K. M. Atkinson, Lyme Park
Ogston Hall	SK3759	Turbot	*c.* 1900?	Wildlife Cover/Ornament	Miss E. Wilson
Renishaw Hall	SK4378	Sitwell	1890–1900	Ornament	Mr P. Hollingworth, Sitwell Estates
Rivelin Lodge	SK2786	?	*c.* 1900	Ornament	
Strawberry Lee Plantation	SK2780	Rutland	*c.* 1890–1900	Ornament	Sheffield City Recreation Dept.
Sugworth Hall	SK2389	(Wilson)	*c.* 1900	Wildlife Cover/Ornament	Miss E. Wilson
Sydnope Hall	SK2964	(Wilson)	*c.* 1900	Wildlife Cover/Ornament	Miss E. Wilson
Upper Derwent Dale	SK1789	Wilson	*c.* 1900	Wildlife Cover/Ornament	Miss E. Wilson
Wentworth	SK3997	Fitzwilliam	*c.* 1920	Game Cover	Mr G. J. R. Broadhead, Fitzwilliam Estates

(Wilson): Estates owned by friends or relatives of the Wilsons.

superficial geological features. At a number of sites such as Stand Wood, Chatsworth or Upper Derwent Dale, *R. ponticum* is cleared from within woodlands and maintained as an 'amenity screen' around woodland edges and roadsides. The obvious drawback with such a policy is the constant source of abundant seed adjacent to managed woodland which provides ideal regeneration habitats.

The picture which emerges is that *R. ponticum* has been introduced to what are often the ideal situations for it — acid soils, sheltered moist woods and valleys with abundant sites for regeneration by seed. In addition to this, the exposure of some sites to periodic very strong winds ensures successful dispersal.

Within the Peak, *R. ponticum* is generally absent from the Carboniferous Limestone. Where it has been introduced (presumably on the more acid soils) its spread is clearly restricted by lack of suitable soils. Being shallow rooted, it is able to grow in relatively thin layers of acid soil overlying calcareous soil or rock.

Around the perimeter of the White Peak, *R. ponticum* is abundant and widespread in the horseshoe-shaped regions of Millstone Grit and associated geology to the west, east and north. It is most successful on the wooded slopes below the gritstone edges of river valleys to the east (e.g. Chatsworth) and the west (e.g. Errwood). The occurrence and spread in the northern gritstone area is probably restricted by the bleak, open, high altitude topography of the Kinder/Bleaklow massif. The river valleys along either side of this central area of the Dark Peak and further south, the White Peak have abundant *R. ponticum*.

The maximum altitude at which *R. ponticum* occurs in the Peak District is between 300 m and 400 m. High altitude sites include Broomhead Moor (320 m), Kinder Reservoir (305 m), Wood's Cabin on Kinder (SK0592) (380 m), Strawberry Lee Plantation (380 m), Fairthorn (380 m), Chatsworth (305 m) and Errwood (300–400 m).

In the regions east of the Peak District, *R. ponticum* is less abundant though still widespread. It occurs most frequently on sites that either are or were parts of estates (large or small) during the late 1800s and early 1900s. Bushes in gardens at Nether Edge, Sheffield, for example, pre-date the present houses (*c.* 1930). The bushes originate from the grounds of the local hall and have since been absorbed into the suburban development. Throughout the Coal Measures regions around Sheffield the occurrence of *R. ponticum* is restricted by extensive housing and industrial development.

Further east *R. ponticum* is generally restricted to the large estates, particularly on the Bunter Sandstone of the Dukeries around Worksop. It appears to be absent from the Magnesian Limestone for much the same reasons as from most of the Carboniferous Limestone. It is probably further restricted to the east by increasingly intensive land-use for agriculture.

The presence of *R. ponticum* in the area clearly poses a serious problem for management of commercial forests. Its effects on wildlife depend on the habitat being invaded. Of the major suitable habitats, heather moorland is unlikely to be seriously affected — *R. ponticum* probably becoming just another member of a largely ericaceous plant community. In very moist sites such as moorland bogs, invasion is severely restricted due to waterlogging so the problem is minimal (e.g. Reddicar Bog, SK2687). Acidic grasslands which suffer some grazing pressure seem to be vulnerable to invasion as at Cordwell. At all sites where grazing livestock are present, there is the potential problem posed by the toxicity of *R. ponticum* foliage.

Undoubtedly, woodland habitats are the most threatened by invasion. Relatively unmanaged or undisturbed woods seem less suitable for regeneration from seed. Managed amenity/commercial woods such as Stand Wood, Chatsworth, may therefore pose the major problems. Semi-natural oakwood relics such as at Padley Gorge (SK2579) are also being invaded. At Padley this is from the introduction at Longshaw, a wood which is both grazed and suffers severe human disturbance. The abundant, apparently suitable, regeneration sites may encourage further invasion, but the situation at present appears to be stable.

The impact of *R. ponticum* on the local environment is a mixture of harmful and

beneficial effects. Whilst creating problems for woodland management and swamping existing vegetation, it adds diversity to some areas. The dense scrub which it forms provides ideal nesting sites for many birds, including regionally rare species such as the nightingale at Clumber. Many important winter roosts of finches and thrushes are in extensive *R. ponticum* beds. The dense cover also provides shelter for mammals such as badgers which may have their setts within large patches of *R. ponticum*. In addition, *R. ponticum* has considerable amenity value, being very popular for its spectacular displays of flowers in June (such as at Cordwell and at Errwood). It is very useful in providing cover, screening and impenetrable protection for areas subject to intense visitor pressure, such as Chatsworth and Clumber.

It unlikely and also of questionable desirability that *R. ponticum* will be fully controlled or eliminated from the area under study. Spread of the species to new sites within the region should be relatively easy to contain. Control within large areas already infested may prove impossible except where large amounts of manpower or finance are available. Key areas to be monitored for signs of further encroachment are the semi-natural oakwoods and possibly some moorlands. With greater understanding of the ecological background to the problem, management may be better placed to discourage further spread. One obvious area in which careful monitoring and control may be useful is the inadvertent creation of regeneration sites. Intensive management for forestry, grazing or amenity may well create suitable sites and thus increase the likelihood of further spread by seed.

Acknowledgements

This work formed part of a PhD research programme in the Department of Botany at the University of Sheffield.

Thanks are due to all those cited in Table 1. Records and comments were also received from many individuals, particularly P. A. Ardron, P. Anderson, D. Yalden, E. Wilson, G. Howe and members of Sorby Natural History Society.

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OBITUARY

GEORGE EDWARD HYDE, F.R.E.S.

George Edward Hyde, who died at Doncaster on 15 January 1986 aged 83, was born locally in 1902 and educated at Doncaster Grammar School; he trained subsequently as a mechanical engineer at Doncaster Plant Works, where he was employed by the LNER. In 1930 he married Kathleen, enjoying a lifelong and devoted partnership. During the Second World War he held a post in Doncaster with the Ministry of Supply. His interest in natural history, particularly entomology, began in boyhood and in 1950 he took up full time writing and photography.

His early writing was for the *Doncaster Chronicle*, with regular weekly contributions, though he subsequently wrote many articles, features, papers and notes for a wide range of magazines and journals including the *Entomologists Record*, *Entomologist*, *The Naturalist*, *Birds and Country Magazine*, *Countryman*, *Country Life*, *Field*, *Amateur Gardening* and *Practical Gardening*. In addition, he was the author of a large number of books and booklets aimed at school and general circulation, the first of which was a series for Blacks: *A Pocket Book of British Insects* (1949), *A Pocket Book of British Moths* (1950), *British Butterflies* (1950) and *British Insects* (1952). For E. J. Arnold he wrote a series entitled *Though Nature's Window* and in 1962 a further series: *Exploring Nature*. 1959 saw the publication by Hultons of four books in the series *Nature's Ways* and again for Hultons in 1963 several booklets in the *Educational Series*. For Warnes he produced the *Picture Reference Series* in 1968. His work for Jarrold and Sons commenced in 1963 with *Butterflies in Britain*, followed in 1977 by a group of miscellaneous natural history booklets and included his final work, some of the photographs in the *Watch* series (1981). Perhaps his most widely known works were the publications for *English Universities Press* in the *Teach Yourself Series*: *Birds*, *A Primer of Ornithology* (1962) and *Entomology* (1961). He also coauthored the monograph 'Notes and views on the Purple Emperor *Apatura iris*' (1964). Much of this work, in particular that for Jarrold, is accompanied by his own magnificent photographs, many of which have been extensively used both internationally and at home, including a recent edition of *Encyclopaedia Britannica*.

He joined Doncaster Naturalists' Society in 1917 and he served as the Society's President in 1931/2, 1958/62 and by special invitation in 1979/80, its centenary year. He was also a member of the British Entomological and the Natural History Society, and was a Fellow of the Royal Entomological Society.

As a practical naturalist he had few equals, for the scope and depth of his knowledge was enormous and his practical skills great. His life's work revolved round the study of lepidoptera and his expertise as a breeder was widely acclaimed. He was particularly proud of a fine series of the Queen of Spain Fritillary, *Issoria lathonia*, which he bred from a female captured in Devon. With characteristic generosity, he disposed of part of this series to other enthusiasts. He was almost equally proficient as an ornithologist, besides being thoroughly conversant with botany.

Meticulously set and maintained, his superb collection of insects, particularly lepidoptera, is undoubtedly one of the finest yet remaining in private hands and contains specimens of historic interest, including a magnificent gynandrous example of the Brimstone butterfly *Gonepteryx rhamni* and an equally fine specimen of the Common Blue *Polyommatus icarus* ab. *radiata*, both of which are figured in *Aberrations of British Butterflies* by A. D. A. Russwurm (1978).

Among his favourite hunting grounds were Hatfield moors, the Sussex downs and the Huntingdonshire woods and latterly he grieved much for their progressive destruction, for his concern for the environment was great. As infirmity overtook him he loved nothing better than recalling the memories of great days spent in the field in the company of his many friends and acquaintances, amongst whom were numbered some of the foremost naturalists of his day, including Dr H. H. Corbett, F. W. Frohawk and Eric Hosking.

George was a man of great compassion and sensitivity, for whom acts of simple kindness were second nature and it is for these qualities that those closest to him will remember him. It is an honour to have known George Edward Hyde, friend, gentleman and naturalist.

To his widow we extend our deepest sympathies.

W. E. RIMINGTON

BOOK REVIEWS

John Cordeaux, Ornithologist by **Brian S. Pashby**, with a foreword by Bob Spencer. Pp. 86 (including illustrations), plus 8 plates and 2 pocket inserts. Spurn Bird Observatory. 1985. £4.50, plus 30p postage and packing, from: Spurn Bird Observatory, Kilnsea, Patrington, Hull HU12 0UG.

John Cordeaux (1831–1899), the renowned Lincolnshire natural historian, was especially distinguished in the field of ornithology. His main work, *Birds of the Humber District*, was published in 1872, but he will largely be remembered for his bird migration studies, far ahead of their time, which brought him international fame. There is surprisingly little readily available biographical information on this noteworthy ornithologist; Brian Pashby's booklet makes a most creditable attempt to draw together the various strands of published and unpublished material, and is therefore very welcome.

Pashby makes no claim to have written a definitive biography: in his words, this is 'an appreciation from one humble ornithologist to another'. Nonetheless, while accepting that this is essentially a tribute, the material he has assembled is very disorganized and could easily have been better presented and more logically arranged; the unnumbered plates (which include a back-to-front facsimile letter and a map and table in a pocket at the end) are without captions and difficult to cross-reference to the text, and there are far too many wasteful blank pages. A further disappointment is the appendix, 'Selection of published papers by John Cordeaux'; with only a little more research, a rather more comprehensive bibliography with *correct* citations could have been compiled, which would have greatly increased the work's usefulness.

Despite these criticisms, ornithologists and those with a more general interest in the history of natural history are indebted to the author for his biographical sketch of Cordeaux.

MRDS

The Return of the Sea Eagle by **John A. Love**. Pp. 227, with 84 b/w illustrations. Cambridge University Press. 1983. £15.00.

The enigmatic title belies the content of this book: it is not a 'story' about the apparently successful re-colonization of this former resident breeding species, but a factual monograph of the Sea Eagle in the British Isles.

There are chapters on Classification, Distribution, Breeding Biology, Food, Persecution and Decline, Conservation, Reintroduction and Recolonization. I found it just a bit heavy going, especially as the text is too often broken by references and scientific names which would have been better in an appendix.

It is easy to criticize and one must acknowledge the amount of research and industry which has gone into the production, but faults there are nonetheless. Where are the 84

black and white plates claimed by the publishers? The few photographs are captioned as figures along with the many line drawings and the statement is thus untrue. At £15, I was not impressed by the overall result but like so many other specialized books, it is full of detailed information for those who require it. Certainly not bedtime reading as was Waterston's *Return of the Osprey*.

JRM

Eric Hosking's Owls by **Eric Hosking** and **Jim Flegg**. Pp. 171, with b/w and full-colour illustrations. Mermaid Books. 1985. Price £7.95.

This handsome paperback celebrates over fifty years of owl photography by the distinguished naturalist, Eric Hosking. His passion for owls has survived the loss of an eye to a female tawny owl, and his love of these fascinating birds communicates itself through a series of excellent photographs, showing a variety of indigenous species in the wild and some of the more exotic species in captivity.

The accompanying text, written in collaboration with Dr Jim Flegg, includes chapters on the owl in history, its habitats and breeding habits, and takes a closer look at two species common in Britain, the tawny owl and Eric Hosking's own favourite, the barn owl. Bird photographers will be particularly interested in the index giving details of the equipment and exposures used for each picture.

The quality of both the illustrations and the text makes this a valuable addition to the ornithological *corpus*, in spite of the large number of books on owls already on the market.

BMD

Country Moods by **Phil Drabble**. Pp. 183, with 46 black and white photographs. Michael Joseph. 1985. £9.95.

This is the fifth collection of newspaper articles by Phil Drabble, presenter of the TV series 'One Man and His Dog'. The subject matter of each short article is very varied but somewhat dominated by his passion for dogs; the naturalist is pleasantly surprised by the occasional gem of original wildlife observation in his own stretch of woodland. His intimate knowledge of his local countryside has led to familiarity with the shy individual animals that share the area.

He gives free rein to his views on a variety of topics connected with the countryside, being unafraid to campaign against government policy on matters such as the extermination of badgers in the attempt to control bovine TB and the inertia of bureaucrats to implement the Wildlife and Countryside Act; he also parades his prejudices (a few of which I share) in favour of the older established order who as farmers and villagers are responsible for our landscape and country traditions. A very readable book to dip into, but the serious naturalist will find little in it.

RDH

Millipedes by **J. Gordon Blower**. Pp. vii + 242, numerous figures, line drawings, tables and distribution maps. Synopsis of the British Fauna (New Series) No. 35. E. J. Brill/Dr W. Backhuys for The Linnean Society of London and The Estuarine and Brackish-Water Sciences Association. 1985. £20, soft cover.

To those who have waited patiently over the years for this long overdue book by an internationally recognized authority, whose dedication to accuracy and illustrative detail is second to none, will not be in any way disappointed.

The work, over three times longer than its 1958 predecessor, considerably expands our knowledge of the millipede fauna of the British Isles and, typical of the author, leaves no stone unturned. About one quarter of the publication is devoted to the general

organization and life history, methods of collection, examination and preservation and the remainder to identification keys and individual descriptions of species with relevant biological, ecological and distribution data for Europe and the British Isles, the latter taking the form of maps based on the Watsonian vice-county system. Most importantly the reproductive organs of each species are fully illustrated, which is essential for accurate identification. There is an excellent glossary and extensive reference list.

The contribution made by members of the British Myriapod Survey, who have been carrying out a survey of the millipede fauna of Great Britain for the last 15 years, is generously acknowledged.

Undoubtedly, this will be the standard work on the subject for years to come and is a must for the professional, professionally related bodies and libraries. No serious student or enthusiast should ignore its importance and for once here is a book on a highly specialized subject which is certainly not beyond the comprehension of the dedicated amateur. Considering the wealth of its contents and the quality of illustrations it cannot be classed as overpriced.

DTR

Oxford Surveys in Evolutionary Biology Volume 2, edited by **R. Dawkins** and **M. Ridley**. Pp. 243. Oxford University Press. 1985. £25.00.

The second annual volume of Oxford Surveys in Evolutionary Biology comprises an Editorial, eight essays by British and American biologists encompassing a very broad spectrum of topics, and a consolidated index.

The contributions range from those which are verbally comprehensible throughout to others whose (essential) algebraic components preclude reading for pleasure except by those fluent in the language. Each essay has a full and up-to-date list of references.

It is invidious to select essays for special attention in a book where standards of argument and expression are consistently high. However, reflecting the reviewer's own interests, it may be excusable to mention two essays in which R. A. Fisher's concepts, and the controversy (which began in the 1920s) between Fisher and Sewall Wright are respectively considered. Historians of science who seek evidence for the value of a scientific disputation as a spur to research will find it here.

The book is slim, clearly laid out and with an attractive, shiny pictorial cover.

DJH

On the Track of Ice Age Mammals by **Antony J. Sutcliffe**. British Museum (Natural History), London. 1985. £12.95.

It almost goes without saying that a substantial book on Pleistocene mammals and environments, and the techniques developed for unravelling the complex stories behind both themes, is likely to be a definitive work if it is written, as in this case, by someone who has been in the Fossil Mammals Section of the British Museum (Natural History) for more than thirty years, and Head of the Section for well over half of that period. Sutcliffe's book is indeed thoroughly readable and superbly illustrated with excellent maps and diagrams, excellent photographs, both historic and contemporary (the latter the work mainly of the author himself), and with a completely new series of stunningly beautiful paintings by Peter Snowball based on Antony Sutcliffe's reconstructions of the scenery and environment at various places and stages in the Ice Age. (These paintings are also available separately from the Museum as large-format postcards.)

In one respect Antony Sutcliffe has been fortunate in that throughout his working life he has been very much at the centre of things, both nationally and internationally, during a period which has seen the greatest advances in both fossil mammal studies and the science of the Quaternary in general since the initial scientific discoveries and interpretations of fossil mammals and the early work on the concept of an Ice Age of the 1820s through to the early 1860s. The many first-hand contacts (the excellent photographs of

both Louis Leakey and his Zinjanthropus site were both taken in Olduvai Gorge by the author in 1960), and his own extensive field research in many parts of the world, are used subtly but authoritatively in many places through the book.

Because of its breadth of approach, the work is perhaps a little difficult to classify in bookseller's terms. I find it hard to believe that any specialist research worker in the fields of Quaternary studies or fossil mammals could fail both to enjoy and learn much from this book. Also, as an outstanding introduction not only to Pleistocene fossil mammal studies on a world-wide basis, but also to fields such as the reconstruction of past environments from geological evidence, the book is bound to be on every undergraduate and sixth form reading list for many years to come.

However, in addition it has something for everyone with a general interest in natural history, perhaps the best evidence of this being the announcement that the Readers Union group of book clubs has snapped up the title within weeks of its publication.

PJB

The (Almost) Compleat Angler by **Timothy Benn**. Pp. 96, with numerous black and white illustrations. Victor Gollancz. 1985. £6.95.

This book will not help the aspiring angler to catch more or even bigger fish. It is for those who have already enjoyed some years of pitting their wits against an elusive, scaly quarry, who have endured the tribulations of blizzards in spring, torrential rain on Midsummer's Day and been plagued by multitudes of midges in autumn whilst on the banks of some expanse of water. It is a compendium of pictures, poems, cartoons and quotations published during the past 500 years which illustrate the joys and heartaches of the addicted angler. Such a small book cannot be exhaustive and there is an emphasis on items from out-dated tackle catalogues and old prints, postcards and cigarette cards. There is more to fishing than just catching fish and this is the book to pick up and enjoy in midwinter before a warm fire or dip into on a hot summer's day when even the fish are lethargic. One can then wallow in nostalgia and indulgently smile at the caricatured piscator.

TC

Physiological Ecology of Lichens by **K. A. Kershaw**. Pp. x + 293, including numerous figures and tables. Cambridge University Press. 1985. £30.00.

Lichens are excellent bioindicators of a wide variety of environmental conditions, being particularly useful in monitoring ambient air pollution levels. They also show remarkable physiological adaptations to specific environmental situations; in fact, their robust qualities as experimental systems in the field of physiological ecology attracted the initial interest of Professor Kershaw to these plants. Since 1972 there has been a constant flow of important periodical articles from Kershaw and his co-workers in Canada, mainly on physiological-environmental interactions, particularly of lichen-dominated systems (about 70 of which are cited in this book). This extensive and stimulating research output has been collected together in the present volume. Kershaw's team has not been the only contributor to lichen eco-physiology: due acknowledgement is made in this book to the research work of O. L. Lange, J. W. Millbank, D. H. S. Richardson, D. C. Smith and others, as testified by the excellent bibliography of more than 370 titles.

The whole provides a most readable overview, complemented by a wealth of data, much of it in the form of figures (174) and tables (7). Topics covered include temperature, moisture, ionic criteria, nitrogen fixation, photosynthesis, respiration, growth, phenotypic plasticity, and differential strategies.

Production quality is generally reasonable, but an inferior paper has been employed; the figures (with the exception of nos. 11, 14 and 78) are clear, although there is a tendency to crowd too much information onto some of the graphs, and the two plates do not add materially to the text. A few typographical errors have been noted, and there are

several inconsistencies in the citation of Latin names, e.g. *Hypogymnia/Parmelia physodes*.

Many will be delighted to see this long-awaited seminal book finally in print (the preface is actually dated 1983); it adds very considerably to our understanding of physiological adaptations not only of lichens, but of plants in general.

MRDS

Seed Physiology by **John A. Bryant**. Pp. iv + 76, with numerous text figures and tables. Institute of Biology's Studies in Biology No. 165. Edward Arnold, 1985. £3.95 paperback.

The book begins with a useful brief description of seeds and their development from fertilization to maturity. There then follow sections on dormancy, its causes and breakage, and the processes of germination up to the point where the seedling becomes established and no longer dependent on the seed. Finally, there are two chapters relating seed physiology to ecology and agriculture. The former mainly discusses the relation between dormancy, polymorphism and seed banks and the growth of the seedling under suitable conditions. The final chapter, the longest in the book, discusses seed longevity, viability and vigour as it applies to agricultural germination, and the value and improvement of seeds collected as crops for nutrition or commerce.

This is a good introduction to the subject, with only a few minor errors of typography, and can be strongly recommended. Its size necessitated much interesting material being left out, but useful suggestions for further reading are provided. To this list I would add a recent book by Fenner (*Seed Ecology*, 1985, Chapman and Hall), which considers seeds from a more ecological viewpoint.

WHGH

NORTH SEA FORUM

REQUEST FOR INFORMATION

The North Sea Forum, which comprises a number of voluntary and statutory environmental organizations and is chaired by Lord Cranbrook, has been formed to brief ministers at an early stage in the run-up to the UK Conference on the North Sea. This is being held in November 1987 and briefing by the Forum must be completed by November 1986.

Working Groups on Species, Habitats and Human Impacts related to the North Sea have been established. These are currently canvassing professional opinion through the mechanism of very short questionnaires on issues identified by the Forum as meriting attention.

The overall objective of the study undertaken by the North Sea Forum is to assess the health of the North Sea, based on as broad a spectrum of comment as possible. Thus, we need your help!

If you would like to contribute to the study, or receive further details, please contact Edwina Milesi at CoEnCo, The London Ecology Centre, 80 York Way, London N1 9AG. Tel: 01-837-5359.

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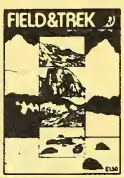

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Relative Abundance and Foraging Habits of *Bombus monticola* on Heather Moorland in North-East Scotland — *R. Hewson*

The Breeding Birds of a Stretch of the River Tees within the Moor House National Nature Reserve, Cumbria, 1979–1983 — *Paul M. Burnham*

A First Look at the Genus *Taraxacum* in South-East Yorkshire (VC61) — *E. Chicken*

Entomological Reports for 1972–1985 — Coleoptera: Part 3, Staphylinidae (Aleocharinae) — *M. L. Denton*

Yorkshire Naturalists' Union Excursions in 1985 — *H. S. Pellant and C. Pellant*

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RELATIVE ABUNDANCE AND FORAGING HABITS OF *BOMBUS MONTICOLA* ON HEATHER MOORLAND IN NORTH-EAST SCOTLAND

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Introduction

This paper considers the relative abundance and foraging behaviour of *Bombus monticola* Smith 1849 on heather moorland in Strathdon, Grampian, north-east Scotland, and compares these with the situation in the Peak District of England as described by Yalden (1984). The few records of the feeding habits of *B. monticola* on mountains or moorland are listed by Yalden (1982). Alford (1975) describes *B. monticola* as inhabiting mainly the *Vaccinium* zone of mountains and moorland, being common in many suitable localities in Scotland and Wales, and foraging on *Vaccinium myrtillus*, *Erica* spp. and *Calluna vulgaris*.

On moorland in the Peak District *B. monticola* queens, emerging in late April, foraged mainly on *V. myrtillus* or if this was not yet flowering, on *Salix* spp. *Vaccinium* spp. accounted for most of the foraging by *B. monticola* in May and June, mostly *V. myrtillus* in May and *V. vitis-idaea* in June. During July plants of the moorland fringe, *Lotus corniculatus* and *Trifolium repens*, accounted for 27 per cent and 29 per cent respectively of foraging compared with the 28 per cent of foraging on *E. cinerea*. In August and September *B. monticola* again foraged mostly on moorland plants, *Calluna vulgaris* (43 per cent) and *Erica cinerea* (34 per cent) in August, *V. myrtillus* (73 per cent) in September (Yalden 1984). *B. monticola* was less numerous on the Peak moorland than white-tailed bees (Yalden 1983b).

The Study Area

The study area, used principally for work on mountain hares *Lepus timidus*, extended from 400 m to 679 m O.D. The underlying soils were largely shallow or undifferentiated hill peats and drifts derived from granite or from a mixture of acid and basic rocks (Heslop & Bown 1969). Dry moorland dominated by *Calluna vulgaris* covered much of the ground below 550 m with *Arctostaphylos uva-ursi* on well drained gravelly areas and *E. tetralix* and *V. vitis-idaea* in damper places. *V. myrtillus* was not common and occurred most frequently in areas of late snow-lie above 550 m. *E. cinerea* was also uncommon.

A vegetation map of 250 ha between 400 m and 480 m O.D. was prepared from an aerial photograph of 1980 which showed most of the boundaries of patches of heather burned in previous years to provide young shoots for red grouse *Lagopus lagopus scoticus* to feed on. The heather was classified into four main phases (Watt, 1955): pioneer (22 per cent), early building (10 per cent), late building (18 per cent), and mature (37 per cent). Two further categories, wild grasses (3 per cent) and re-seeded pastures, heavily grazed by sheep and cattle (11 per cent), held few flowers of interest to bees, and were not included in counts of bumblebees.

Regeneration after burning (the pioneer and early building phase, 32 per cent of the study area) was slow, with initial colonization by *V. vitis-idaea*, *E. tetralix*, and *A. uva-ursi*. *E. cinerea*, another colonizer of newly burnt areas, was uncommon. These were superseded in the late building stage by an almost pure stand of *C. vulgaris* which persisted through the mature to a degenerate state or to burning. Little burning was carried out above 550 m and none on the summit. There appeared to be no willows (*Salix* spp.) within 5 km, the foraging range of bumblebees as described by Heinrich (1979), and the moorland fringe contained few or none of the important peripheral food plants of *B. monticola* in the Peak District; *Ulex europaeus*, *Rhododendron ponticum*, *L. corniculatus*, *T. repens* and *Chamaenerion angustifolium*.

In 1985 the study area was divided, for the purpose of counting bumblebees, into a Lower (400–550 m) and an Upper (above 550 m) part. At 650 m the height of the

windswept vegetation ranged from 0.5 to 3.0 cm. The composition of this vegetation was more uniform than at lower altitudes. Twenty 1 m^2 quadrats showed it made up of *C. vulgaris* (48 per cent), *Empetrum nigrum* (23 per cent) and *A. uva-ursi* (19 per cent) with traces of *V. vitis-idaea* in half the quadrats sampled.

Sheep grazed the study area, particularly pioneer and early building heather, and the surrounding moorland from August to October 1983 and 1984 but had no apparent effect upon the vegetation.

Methods

Bumblebees were counted in the course of other work during 1984 and 1985. A few counts were also made in 1982. Counts generally continued over 2 hours or more over the same area and along approximately the same route. This was designed to cover as many patches as possible of short (pioneer or early building) heather (32 per cent of the vegetation cover), regenerating after burning, with, in order of abundance, *V. vitis-idaea*, *E. tetralix*, *A. uva-ursi* and, more especially on higher ground, *V. myrtillus*. The proportion of *C. vulgaris* increased with years after burning but the majority of the flowering shoots were grazed by mountain hares (Fig. 1). Few bumblebees foraged on late building or older heather. The counts were comparable between seasons and between areas. Bees were counted as they fed or, when flying past nearby and identifiable, as *B. monticola* or white-tailed bees. Identifiable white-tailed bees were usually *B. magnus* or *B. lucorum*, which Pekkarinen (1979) considers to be conspecific. *B. jonellus*, found on heather moorland elsewhere in north-east Scotland, was not identified on the study area although it occurred nearby. Bumblebees were absent on many visits to the study area due to inclement weather.

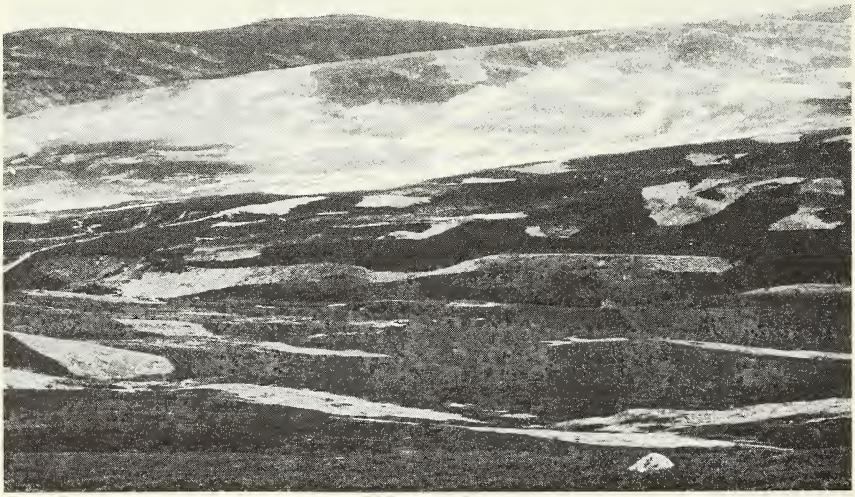

FIGURE 1
Pattern of burnt areas of heather adjacent to the study area

Results

Relative abundance

In both 1984 and 1985 *B. monticola* out-numbered white-tailed bees throughout the season (Wilcoxon signed-ranks pairs test (Siegel 1956) T = 2, P = 0.02 for 1984, T = 0, P = 0.02 for 1985). Peak numbers of *B. monticola* occurred in late June/early July 1984 and early June 1985 (Tables 1 and 2). There was no spring peak in white-tailed bees but

TABLE 1
Counts of bumblebees on heather moorland at Corgarff in 1984

Date	*Bombus monticola*	White-tailed bees
23 June	2	
30 June	24	6
6 July	30	9
14 July	6	6
15 July	2	1
19 July		1
22 Aug	6	5
15 Sept	34	25
16 Sept	24	6

there was an autumn peak in both species in September 1984. In 1985 counts did not extend beyond July. The spring peak in *B. monticola* was more marked on the high ground when the numbers of each species are compared ($X^2 = 9.05$, 1 d.f., $P < 0.01$).

Counts on 12, 13 and 15 May 1982 again showed a marked preponderance of *B. monticola*, a total of 34 against 12 white-tailed bees (binomial test, Z = 3.1, P = 0.001).

TABLE 2
Counts of bumblebees on heather moorland at Corgarff in 1985

	Lower (400 m–550 m)		Upper (550 m–679 m)	
Date	*Bombus monticola*	White-tailed bees	*Bombus monticola*	White-tailed bees
26 May	9	4	7	
27 May	5	3	7	
1 June	25	5	3	
3 June	13	2	52	4
9 June	2			
15 June	2	3	21	1
16 June	2		2	
23 June	4	3	2	
16 July	5	3		
22 July	5	2		
23 July	4	1		

Food plants

The early 1984 peak in *B. monticola* was associated with feeding on *V. vitis-idaea* but the 1985 peak with *A. uva-ursi* (Tables 3 and 4). Foraging on *A. uva-ursi* was particularly noticeable on the high ground where it formed a substantial and very obvious part of the vegetation which, being short due to exposure, may have facilitated foraging. The early foraging in May 1982 was also on *A. uva-ursi*, although this was not fully in flower by 13 May 1982. *A. uva-ursi* had not begun to flower on 14 May 1983.

TABLE 3

Foraging by *Bombus monticola* and white-tailed bees on moorland in 1984 and 1985

	Arctosphylos uva-ursi	*Vaccinium vitis-idaea*	*Erica tetralix*	*Erica cinerea*	*Vaccinium myrtillus*	*Calluna vulgaris*
B. monticola						
1984		66	48	2		11
1985 Lower	19	2	1	4		
1985 Upper	38				6	
White-tailed bees						
1984		14	19	10		23
1985	5	3		1	2	

TABLE 4

A comparison of foraging by *B. monticola* in north-east Scotland (present study) and in the Peak District, England (Yalden 1984)

	Main food plants		
	North-east Scotland	Peak District	
April		*V. myrtillus*	96.7%
		Salix spp.	3.4%
May	*A. uva-ursi*	*U. europaeus*	18.6%
		V. myrtillus	65.3%
		V. myrtillus / *V. vitis-idaea*	12.0%
June	*A. uva-ursi* (1982, 1985)	*Vaccinium* spp.	65.2%
	V. vitis-idaea (1984)	*Rhododendron*	22.6%
July	*V. vitis-idaea*	*L. corniculatus*	27.5%
	E. tetralix	*T. repens*	28.9%
		E. cinerea	28.2%
August	*E. tetralix, E. cinerea*	*C. vulgaris*	43.1%
	C. vulgaris	*E. cinerea*	33.6%
		Chamaenerion angustifolium	14.6%
September	*E. tetralix*	*V. myrtillus*	73.5%
		C. vulgaris	18.4%

There were big differences in the food plants used in the autumn peak of 1984 (Table 5). *B. monticola* preferred *E. tetralix* ($X^2 = 12.59$, 1 d.f., $P < 0.001$) and *V. vitis-idaea* ($X^2 = 5.08$, 1 d.f., $P < 0.01$) and white-tailed bees chose *Calluna* ($X^2 = 10.00$, 1 d.f., $P < 0.001$) and *E. cinerea* ($X^2 = 11.37$, 1 d.f., $P < 0.001$).

During the spring peaks in *B. monticola* white-tailed bees fed on the same species of moorland plants which were all that were available at the time.

TABLE 5
Foraging by *B. monticola* and white-tailed bees 15/16 September 1984

	V. vitis-idaea	*E. tetralix*	*E. cinerea*	*C. vulgaris*
B. monticola	10	38	1	9
White-tailed bees	0	10	10	18

Discussion

While *B. magnus/lucorum* is widely distributed throughout Britain, *B. monticola* has a northern and western distribution (International Bee Research Association/Biological Records Centre, 1980) which largely coincides with the distribution of *V. myrtillus* (Perring & Walters 1962). *B. magnus/lucorum* appears early and exploits *Salix* spp. *B. monticola* appears later and on moorland exploits *V. myrtillus*, *V. vitis-idaea* or *A. uva-ursi*, the first in the Peak District, the latter two at Corgarff.

Yalden (1983) considers *B. monticola* in the Peak District an animal of the moorland fringe, a description which in Scotland might more correctly be applied to *B. magnus/lucorum*. At Corgarff *B. monticola* more successfully exploited the early flowering moorland plants than did white-tailed bumblebees, and had an apparently adequate food supply throughout the season, mainly *E. tetralix* which was preferred to the more abundant heather. It appeared particularly well able to forage high on the hill, where it out-numbered white-tailed bumblebees more sharply than at lower altitudes. In Glen Clova, Tayside on 4 July 1979 all of 29 bumblebees foraging on *V. myrtillus* at altitudes between 800 m and 1000 m were *B. monticola* (Hewson, unpublished). While *B. monticola* may be better able than other species to exploit moorland plants provided that an early source of food is available to the over-wintered queens, and at Corgarff it was consistently more abundant than white-tailed bumblebees, white-tailed bees may be able to exploit a wider range of moorland situations. In north-west Scotland on low-altitude moorland dominated by *Trichophorum* heath and *C. vulgaris*, they foraged on *Salix* in April, *Ilex aquifolium* in May, *Iris pseudacorus* in June and *Erica* spp. and *C. vulgaris* thereafter (Hewson 1979). *B. monticola* was absent. On heather moorland in Yorkshire *B. lucorum* was much more abundant than *B. pascuorum* on *E. tetralix* and *C. vulgaris*, the main food plants (Hewson & Walsh 1981). *B. monticola* was again absent. The common factor in these two moorland areas was the virtual absence of *V. myrtillus*, *V. vitis-idaea* and *A. uva-ursi*, the main early food plants of *B. monticola*. *Salix* apparently will not suffice for this purpose for *B. monticola*.

At Corgarff *B. monticola* was consistently more abundant than white-tailed bumblebees; in the Peak District the reverse was the case.

In the Peak District *B. monticola* relied largely upon *Vaccinium* spp. until mid-June when they ceased to flower. Despite some foraging (28 per cent) on *E. cinerea*, plants of the moorland fringe *L. corniculatus* (28 per cent) and *T. repens* (29 per cent) were much used in July. In August *C. vulgaris* came into flower and provided the main food source (43 per cent) in that month before a massive return to foraging on *V. myrtillus* in September (Yalden 1984). At Corgarff, on the other hand, there was no gap in flowering of moorland plants, and no moorland fringe plants were available. *E. tetralix* was common

and available throughout the summer; it was preferred by *B. monticola* to *C. vulgaris*. Also, as Yalden (1984) suggests, white-tailed bees may be less able to feed from the small pendulous flowers of *V. vitis-idaea* than the smaller *B. monticola* queens and workers. The suggestion by the same author that *B. monticola* is in some ways morphologically and/or physiologically adapted to *V. myrtillus* does not accord with its relative abundance at Corgarff where this plant is uncommon, but does not rule out the possibility that *B. monticola* may be better adapted to feed on *A. uva-ursi* (absent from the Peak District), *V. vitis-idaea* and *E. tetralix* or that it is better adapted to montane conditions e.g. by having a hairier body and being a stronger flier. Welch (1974) refers to *B. monticola* and *B. jonellus* as strong fliers visiting flowers in exposed windy places in the Cairngorms.

The shift in foraging from moorland to moorland fringe by *B. monticola* in the Peak District may place it at a disadvantage compared with the more versatile white-tailed bumblebees and may provide the likeliest explanation for the difference in relative abundance compared with *B. monticola* at Corgarff, which enjoys a continuum of flowering plants on the moorland and where there is neither moorland fringe nor *Salix*.

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THE BREEDING BIRDS OF A STRETCH OF THE RIVER TEES WITHIN THE MOOR HOUSE NATIONAL NATURE RESERVE, CUMBRIA, 1979–1983

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Introduction

Moor House National Nature Reserve covers over 4000 hectares of remote moorland in the northern Pennines and is situated just south of Cross Fell, 893 m O.D., the highest point in the Pennines. The Reserve has an altitude range from 550 m O.D. to 847 m O.D. The summit ridges of Great Dun Fell, 847 m O.D., and Little Dun Fell, 842 m O.D., form a natural barrier dividing the Reserve into two. The western escarpment falls steeply away, dissected by deep valleys with swift running streams. The ground to the east falls gently away, with slower running streams dissecting a large area of blanket bog. The area in which the survey was carried out forms the watershed for the River Tees.

Since the Reserve was established in 1952, daily observations have confirmed that it supports a good mixed population of breeding birds associated with large areas of the northern Pennines. The upland birds of Britain and their populations are poorly documented because, as Fuller (1982) describes, they are difficult to census as much of the uplands is inaccessible and some species can easily be overlooked. This more detailed survey was undertaken to determine the breeding bird population of a stretch of the River Tees in order that future trends in species populations, resulting from management or natural factors, can be monitored.

Survey Method

The survey was carried out using the British Trust for Ornithology Waterways Bird Survey, which employs the territory mapping method (Williamson 1977). Although principally designed to record riparian species, I have included Dunlin and Golden Plover in this survey.

This mapping technique was used with observations being plotted on successive visits during the breeding season. The resulting registrations were analysed by BTO to give evidence of the number and extent of occupied territories.

The 5 km section of river was walked at regular intervals from April to July during the five survey years from 1979 to 1983. The number of walks varied between eight and ten in each survey year; a similar number of walks was aimed at in each season in order that yearly results could be compared. Visits were made at all times of the day but mostly during the mornings and, where possible, the days with the best weather were chosen. The route was walked mostly from south to north but varied occasionally. The time taken varied between 1.5 and 2 hours.

I was living on the Reserve at Moor House from 1977 to 1980 and, during that period, spent many hours in the field keeping daily records of bird activities. I have used these additional observations throughout this report to give a more complete picture of the breeding habits of birds found here and factors influencing breeding results.

Study Area

The stretch of river surveyed is part of the upper catchment of the River Tees, which forms part of the northern and eastern boundary of the nature reserve. The river passes through moorland dominated by *Calluna vulgaris*, *Eriophorum* spp. and *Sphagnum* blanket bog which in places abuts the water's edge, sometimes forming steep peat banks of up to 3 m in depth. Mixed coarse grasslands of *Nardus stricta* and *Juncus squarrosus* form swards on the shallower peat, especially on the steeper banks. In other areas where drainage is poor, sizeable wet flushes occur beside the river, forming good cover with *Juncus effusus*, various *Carex* and *Sphagnum* spp. *J. effusus* also forms strips and clumps

along the many streams and waterways that empty into the river's course, often extending in a band along the river edge. Species rich mixed grassland of various *Agrostis* spp. and *Festuca* spp. occurs on the alluvial edges of the river and on some of the islands, while some islands are of a coarse, mat grass and heath rush mixture.

The Reserve differs from the surrounding fells in that it is grazed by sheep during the summer months only. The harsh winter climate and remoteness of the area prevent all year round grazing. Sheep numbers are also generally low and the stocking rate is estimated at one sheep per 0.44 ha (Rawes & Hobbs 1979) although numbers on the blanket bog areas are normally found to be considerably lower. Sheep are known to be selective feeders, preferring the grasslands and patches of sweet grass on the alluvial areas and reducing these to a fine short sward. The light grazing of the heather results in a heavier crop than on similar fells. Although a managed and keepered grouse moor for over 100 years, no management other than irregular burning of small areas for experimental purposes has been carried out and the moor has remained unshot for over 40 years.

River Section

This stretch of the river is gently sloping, running from Tees Bridge, 530 m O.D., a distance of 5 km to Cow Green Reservoir at 490 m O.D. Normally slow running and shallow during summer months, it is subject to spate conditions which can transform it into a deep, rapid torrent. The width of the river channel is fairly constant, varying between 10 and 20 m, but occasionally, where it has been divided into separate channels with islands, it has been enlarged. One group of small islands is 30 m wide and another over 50 m. During the summer, however, the water table is low and the stream only occupies approximately half of this channel. The river bed is made up of fairly even sized shingle with rocks becoming much larger and boulder-like towards Cow Green Reservoir. This shingle has been pushed up to form borders to some islands and large shingle banks have been exposed on some bends. The small islands that occur change shape and size annually due to erosion and shingle movement.

The river banks are mainly shallow sided except occasionally where the deep peat (up to 3 m) has been eroded to the water's edge. No fringe or channel vegetation of any significance occurs along the entire survey area.

Bird Communities

The topography of the area is of gently contoured moorland dissected by winding, narrow water courses and erosion channels leading into the River Tees. Blanket bog covers most of the area, with a good covering of heather which supports a fluctuating population of Red Grouse, at times with high densities. Meadow Pipits, however, are the most abundant species occurring over the Reserve. Occasional outcrops of limestone occur, forming islands within the blanket bog, these areas becoming larger on the higher ground. Golden Plovers breed in these areas in good numbers and are also found on the sub-alpine grassland of the summit ridges. Curlews and Snipe are found scattered sporadically over the area, breeding in the wet, rushy areas whilst wetter conditions on the higher ground, particularly areas containing small pools, attract small numbers of Dunlins to breed. Whilst Peregrine, Kestrel and Buzzard are recorded over the Reserve, no cliffs or trees are available for nesting; however, Short-eared Owls and Merlins breed in the heather. It would seem an ideal habitat for Hen Harriers but singles are only recorded passing through in the spring and autumn. Watson (1977) records nest sites as common at elevations of between 150 and 400 m O.D. in Britain and in Wales commonly recorded between 375 and 600 m O.D.; an inadequate food supply at the high elevations is thought to be the main reason for lack of nesting and this would seem to be the prime reason at Moor House. The Merlin feeds almost exclusively on Meadow Pipits, but latterly a number of small experimental tree plantations of mainly coniferous species have grown up and attracted a number of small passerines which the Merlin has been quick to exploit as an additional food source. Ring Ouzels and Whinchats are two species known to have

bred in these plantations, the Ring Ouzel otherwise only found in very small numbers. The Whinchat is found exclusively in or near these plantations. Dunnocks, Redpolls, Blackbirds and Willow Warblers are some of the species known to have bred in these plantations but are uncharacteristic of the area and have nested on single occasions only. A number of mine ruins with rocky spoil heaps are dotted throughout the area and occasionally Wheatears and Ring Ouzels breed in these. Ducks only occur in small numbers, with Teal being found well into the blanket bog on quite small water courses but Mallards tend to be found near the main river. Waders such as Redshank, Oystercatcher and Lapwing are generally found along the main river system but Common Sandpipers can frequently be found feeding in the small streams and will sometimes nest away from the main water course. Dippers, too, will feed almost to the source of the smallest stream but nests are always found on the main river system. Black-headed Gulls are commonly found patrolling the river and surrounding moorland.

Species Recorded Breeding (see also Table 1)

Anas crecca (Teal)
More common than the Mallard over the Reserve with 10–15 pairs present. Six pairs were found breeding on the survey area during 1980, 1982 and 1983 but, like the Mallard, a dramatic drop occurred during 1979 and 1981 when only three pairs bred. Pairs recorded arriving on their breeding areas during the middle of April. Broods of fairly young chicks (5–10 days) recorded from the middle of June. All nests found have been in heather and always some distance from water (Parkin 1977).

Anas platyrhynchos (Mallard)
Only small numbers, less than ten pairs, occur on the Reserve. A maximum of four pairs were found breeding on the survey area during the years 1980, 1982 and 1983 and only one pair during 1979 and 1981. A drop in numbers was also recorded during these years for Teal. First pairs recorded in early March, occasionally earlier during mild spells. Main egg lay seems to occur in early May.

Mergus merganser (Goosander)
Up to three pairs present in some years. The first evidence of breeding recorded on the Reserve in 1975 (Parkin 1977). A pair usually present during the middle of April. Two pairs in 1979, but often recorded earlier during mild spells. Recorded breeding on the Reserve in 1979 when a brood of a few days old were seen on 4.7. Well grown juveniles were recorded in the following years on 23 June 1980 and 9 July 1981. Two pairs were present in 1982 and 1983 but no evidence of breeding was found. The nesting site has not been found but the species probably breeds in rabbit holes or old disused mine entrances along the river bank.

Haematopus ostralegus (Oystercatcher)
This species is increasing in the area and breeding numbers have risen dramatically since 1977 when only one or two pairs were recorded along the Tees (Parkin 1977). The number of territories has risen on the section surveyed from three in 1979 to seven in 1983. Singles sometimes occurred in late March but pairs were not usually recorded on their breeding ground until mid-April. Nests found have been on shingle banks or islands which are vulnerable to river spate. This species also seems vulnerable to nest predation and only three young are known to have fledged successfully during the five years of the survey. A number of non-breeding birds are always recorded along the river during the breeding season.

Pluvialis apricaria (Golden Plover)
Breeds in good numbers on suitable ground on the Reserve and is found at high densities on nearby Bellbeaver Rigg. Numbers have fluctuated along the survey route between three pairs and one pair. Birds return to the fell at the first onset of mild weather and individuals can be heard displaying in February as the snow retreats. Storms, however,

usually push them back down to lower ground at this early date, the main body not arriving until the middle of March to April. A wide variation in dates for nesting has been recorded, caused by the fluctuations of the weather. Nests found beside the river have been in coarse grassland containing patches of lichen and stones.

Vanellus vanellus (Lapwing)
A fairly common species occurring along the Tees during 1979 and 1980 when nine and ten pairs were recorded respectively. A large decrease was recorded in 1981 when blizzards in late April pushed all Lapwing down from the Reserve to lower altitudes; only three pairs returned but did not breed. Numbers recovered slightly in 1982 to six breeding pairs but did not increase the following year when only five pairs were recorded. Flocks start to move through in February and birds can be seen displaying over their breeding territories during March and early April. Clutches can be complete before the end of April, although the bulk of eggs are probably laid towards the end of the month and the beginning of May. Nests are made on islands with shingle and patchy grassland, or beside the water on coarse, grassy swards. The nests on the islands are prone to river spate but with early nesting, eggs can be lost to snow cover and frost damage.

Gallinago gallinago (Snipe)
An uncommon species over the Reserve and little information is known of their breeding habits at this altitude. I have found a nest containing three eggs at 600 m O.D. and another was found at 640 m O.D. (Parkin 1977). It is interesting to note that Parkin recorded Snipe as the commonest wader visiting the Reserve between the years 1956 and 1977. Only single pairs held territory during the survey in 1980 and 1982 and, even allowing for observer bias, this would indicate a substantial drop in numbers visiting the Reserve to breed. Birds recorded in mild periods in March. One was heard drumming over the river on 24 March 1980 but most records occur from mid April onwards.

Tringa totanus (Redshank)
Small numbers are regularly found along the Tees during the breeding season. Numbers seem fairly stable along the survey route, varying between four and five territories, with a peak of seven in 1980. Singles recorded in mild weather at the end of March but main arrival from the middle of April onwards. This species seems to be at its altitude limits for breeding ('up to 1500 ft', Witherby *et al.* 1941–1965) and was certainly badly affected by the storms in late April 1981.

Actitis hypoleucos (Common Sandpiper)
This species is by far the most numerous wader on the water courses throughout the Reserve. Numbers have been constant on the survey with 15 pairs in 1979, 16 in 1980 and 1981, but dropping significantly to 11 in 1982, recovering to 19 pairs in 1983. This fall and rise in numbers followed the national trend for this species as indicated in the British Trust for Ornithology Waterways Bird Survey results for 1982–1983 (Taylor & Marchant 1983). This is the last wader to arrive on the river, with singles usually recorded in early April. Earliest recorded 5 April 1980, the main breeding populations arriving at the beginning of May. Common Sandpiper therefore miss the vagaries of the weather during the early months and avoid egg loss due to chilling but, although the well concealed nests usually escape detection by predators, predated nests are occasionally found. Three adults were recorded killed by a Peregrine during the survey.

Larus ridibundus (Black-headed Gull)
Regularly recorded over the Reserve and along the River Tees during the spring and summer period. Numbers seen quartering the river for food during most visits were between 30 and 40 birds but, at favoured resting and bathing places, up to 300 were seen on 14 June 1981. Birds hunt the area during crane-fly and may-fly hatch and many pellets have been found containing fly remains, but it is also thought the gulls supplement their diet with eggs, when available. In 1983 the colony at Cow Green was unable to nest on their usual island as it remained submerged and they moved to a shingle bank on the Tees

near Little Dodgen Pot where 95 nests containing eggs were counted. The colony was raided on several occasions by foxes and most chicks were killed.

Motacilla alba (Pied Wagtail)
Good numbers pass through the area in spring but few stay to breed. A pair nested in the Tees bridge stonework in 1980. Two pairs were present in 1982. This stretch of river with its gradual sloping banks is not ideal for nesting sites.

Cinclus cinclus (Dipper)
Numbers remain constant on the survey route with between three and four territories held in every year except 1982 when only two pairs were found. This decline was thought to be due to the very dry, hot spring which reduced the water level in the streams dramatically, with some of the small water courses drying up completely. Nests found being built on 30 April 1979, 26 May 1981 and another on 14 June 1981. The late dates would probably involve replacement nests from earlier failures or, in a year with an early spring, such as 1981, the start of a second clutch. Most nest sites are on the underside of eroded peat banks and a pair regularly nest under the single bridge that occurs on the route.

Numenius arquata (Curlew)
A fairly common bird throughout the river basin area with fairly stable numbers. Numbers peaking in 1980, however, giving a maximum of five territories along the route compared with three pairs in 1981 and two pairs in all other years surveyed. Can occur in late March but the bulk of breeding birds arrive in the middle of April. Nests in the shallow, boggy valleys containing good clumps of *Juncus effusus* leading down to the waterside and also in heather along the river banks.

TABLE 1
Number of species and territories present during the River Tees survey 1979–1983

Species Present	1979	1980	1981	1982	1983
Grey Heron					*
Teal	3	6	3	6	6
Mallard	1	4	1	4	4
Goldeneye				*	
Goosander	*	2	2	1	2
Oystercatcher	3	4	6	6	7
Ringed Plover					*
Golden Plover	3	1	3	2	1
Lapwing	9	10	3	6	5
Snipe	*	1	*	1	*
Curlew	2	5	3	2	2
Redshank	5	7	4	5	4
Common Sandpiper	15	16	16	11	19
Dunlin			*		
Black-headed Gull	*	*	*	*	95
Yellow Wagtail				*	
Grey Wagtail			*	*	
Pied Wagtail	*	1	*	2	*
Dipper	4	3	4	2	3
Total Species Recorded	13	13	15	16	15
Species Holding Territory	9	12	10	12	11
Number of Territories	45	60	45	48	53 (+ 95 Black-headed Gulls)

* Indicates species present but not breeding.

Species Present but not Breeding

Ardea cinerea (Grey Heron)
Regular visitor to the Reserve in small numbers. Occasional records of birds fishing, especially when water levels are low.

Bucephala clangula (Goldeneye)
This species was recorded on the Reserve for the first time during the course of the survey. A male was present on the river on 14 May 1982 but not recorded after this date.

Charadrius hiaticula (Ringed Plover)
This species is known to occur regularly in small numbers on the lower reaches of the Tees but has only been recorded on the Reserve on two occasions. A pair were recorded on a small shingle bar on 23 May 1983. The female was sitting in a fresh scrape and the male was nearby, but no further sightings of these birds occurred during the 1983 survey.

Calidris alpina (Dunlin)
Infrequently seen over the Reserve and rarely recorded from the river. A single bird recorded on the survey route was perhaps a breeding bird from nearby Bellbeaver Rigg, where they are known to breed.

Motacilla flava (Yellow Wagtail)
Passage birds usually recorded but a male was present on the river on 10 May 1982. Known to breed at lower altitudes locally.

Motacilla cinerea (Grey Wagtail)
Small numbers recorded passing through on passage but good habitat for breeding does not occur along this stretch of river. Known to breed at lower altitudes locally.

For a list of other species recorded during the survey, see Appendix 1.

Discussion

Weather Conditions and Effect on Breeding
Due to the generally severe winter conditions, spring usually comes late to the river at this altitude. Species such as Lapwings, Golden Plovers and Mallards are often recorded when snow lies in March over their intended breeding area. (Dippers, too, are on their breeding ground and with the first signs of warmer weather, nest building begins.) A hard winter can prolong the thaw and retard the breeding season by swelling the river during snow melt, thereby reducing the area of river edge for feeding or size of shingle bank for breeding.

High water is always a threat, either from rapid thaw of snow from high ground or torrential rain in midsummer. River edges and islands are covered, swamping out the ground nesting birds and sweeping away Dipper nests from the underside of banks. The weeks in April are often critical for breeding birds at this altitude; should the weather change as the eggs are laid they can be lost to snow and frost damage. An example of this occurred in 1981 when blizzards struck on 24 and 27 April. First clutches were lost and the birds moved off to lower ground, some not returning to breed again in that year. The breeding season lasts for a very short period at this altitude and the majority of birds have departed from these stretches of the river by mid-July, with only a few stragglers being recorded towards the end of the month.

Nest Predation and Predators
Nests commonly found predated during the course of the survey were Lapwings and Oystercatchers, with single records of Common Sandpipers and Redshanks. Eggs were found away from the nests and appeared to be the work of avian predators. Crows were rarely recorded along this stretch but Black-headed Gulls were common and regularly recorded quartering the river. Up to 300 were counted on 14 June 1981. The Black-headed Gull is known to take eggs of its own and other species, including Lapwing (Witherby *et al.*

1941–1965) and it would seem likely they are the main predators along this stretch, although this was never verified. Two colonies of Black-headed Gulls exist nearby, which could have had an influence on the success of birds breeding in this area.

Two Ravens were recorded hunting the river and surrounding area on one date during the four-year survey. Peregrines were seen following the river on several dates and three Common Sandpipers were found killed by these falcons. Snipe, Golden Plovers and Redshanks are species regularly found at Peregrine breeding sites in the northern Pennines. Merlin have been recorded taking Pied Wagtails and an adult Dunlin was killed by one in 1982. Short-eared Owls were regularly recorded hunting along all stretches of the river in every year but only small mammal remains were found in their pellets when analysed.

Foxes are known to have raided the Black-headed Gull colony on the Tees in 1983, killing many chicks, and are known to follow the river's course regularly throughout the breeding period. Occasional sitting birds or chicks are probably taken by this predator but no further evidence was found to support this during the survey.

Re-seeded Area

In 1978 a local farmer carried out improvement operations to an adjoining area of the fell within 100 metres of the river. Operations involved the removal of natural vegetation (burnt off by herbicide spraying), drainage of the area before rotovating, fertilizing, and seeding with grass species, some of which were of a lowland type. The establishment was slow at first, with much of the topsoil being washed away in the first years, but subsequent re-seeding is proving more successful. The area is becoming established as a grassland, albeit patchy and bare in places, and poor compared with grassland at lower altitudes.

This has had a noticeable effect on the breeding birds of the area, in particular the Lapwing. Lapwings have deserted their usual breeding area along the river and nested in this field in increasing numbers. None was recorded breeding here in 1979 but four pairs bred here in 1983. Despite this additional breeding habitat, numbers for the survey route show a drop since 1979 (Table 2). They are clearly showing a preference for breeding in this type of habitat. Lapwings are known to breed in 'loose neighbourhood groups and less often solitary' (Cramp & Simmons 1983) and this field provides the ideal conditions.

TABLE 2
Lapwing breeding territories

	Re-seeded Area	River	Total
1979	0	9	9
1980	1	9	10
1981	3	0	3 (severe winter)
1982	4	2	6
1983	4	1	5

Redshanks and Golden Plovers are regular visitors here to feed, as are small gatherings of non-breeding Oystercatchers.

Summary

A five-year survey carried out along a 5 km stretch of the river Tees using the British Trust for Ornithology Waterways Bird Survey method showed that a total of twelve species held territory during 1979–1983. A further four species, Grey Heron, Goldeneye, Yellow Wagtail and Grey Wagtail, were also recorded as present but not breeding. A maximum total of 60 territories were held in 1980, Common Sandpipers being the most abundant birds in any one year, with 19 territories recorded in 1983.

The climate, particularly in spring at the onset of breeding, appears to play an important part both in regulating the number of pairs present and time of egg laying. Nests were found predated, presumably by Black-headed Gulls and this had influenced the breeding success rate, especially for species such as the Lapwing and Oystercatcher. Although other predators were present and occasional adults were killed, this was thought not to have had any significant impact on the breeding population.

An area close to the survey route had been improved and sown to grassland. This area, whilst attracting certain species, especially the Lapwing, does not appear to have had any significant effect on the number of birds breeding along the river at present.

The Black-headed Gull has been excluded from this summary to reflect the norm as this colony has not bred on the river before during the 30 years as a National Nature Reserve.

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APPENDIX 1

List of other species recorded during the survey 1979–1983

Buzzard *Buteo buteo*
Peregrine *Falco peregrinus*
Merlin *Falco columbarius*
Kestrel *Falco tinnunculus*
Red Grouse *Lagopus scoticus*
Lesser Black-backed Gull *Larus fuscus*
Herring Gull *Larus argentatus*
Short-eared Owl *Asio flammeus*
Swift *Apus apus*
Skylark *Alanda arvensis*
Swallow *Hirundo rustica*
House Martin *Delichon urbica*
Raven *Corvus corax*
Carrion Crow *Corvus corone*
Rook *Corus frugitegus*
Ring Ouzel *Turdus torquatus*
Wheatear *Oenanthe oenanthe*
Whinchat *Saxicola rubetra*
Meadow Pipit *Anthus pratensis*
Starling *Sturnus vulgaris*

A FIRST LOOK AT THE GENUS *TARAXACUM* IN SOUTH-EAST YORKSHIRE (VC61)

E. CHICKEN

The publication of Richards's *Taraxacum* flora of the British Isles in 1972, together with his willingness to identify specimens, afforded a way into the maze of dandelion 'microspecies' for the field botanist. Even if the ensuing enthusiasm was for some no more than the collecting instinct, still a major route into an interest in natural history, it was a step towards the understanding of the plants and their distribution in Scandinavia and elsewhere.

Unfortunately, though perhaps not surprisingly, ideas about the taxonomy of *Taraxacum*, whether it be the treatment of sections, numbers of species or synonymy, are extremely fluid. The 132 species of Richards's work are now 244 in the list of Haworth and Rundle dated 1 January 1986. The non-expert is still in the position of being reliant on a referee for identification since there is no completely satisfactory dichotomous or other key available. This is in addition to dealing with the extreme phenotypic plasticity of the leaves which means that juvenile plants, those in shaded or other extreme situations and those flowering outside the first flowering period of April and May in this area, are often useless for identification. All these points are dealt with at length in Richards's Flora.

The writer of this list collected dandelions in East Yorkshire as time and the weather permitted mainly from 1973 to 1981 when a spell of ill-health and other factors intervened. With plants as plentiful as dandelions it cannot be claimed that the whole vice-county has been looked at systematically or that distribution has been studied on a statistical basis. However, it is felt that it may be of interest to anyone taking up the pursuit to have a list of the species discovered so far by one person and some comment on locations.

Dandelions of the Section Erythrosperma, with finely dissected leaves, corniculate outer bracts and achenes that have, with the exception of *T. simile* in this area, a reddish-brown tinge or darker colour, are plants of well drained habitats. The majority of the finds listed below have been found on the chalk of the Wolds and the limestone in the north-west of the vice-county. Of particular interest is the presence of five species on the earthworks at Langton and such sites which are protected to some extent are worth examining. The commonest species of the section are *T. brachyglossum* and *T. oxoniense*. The first of these, unlike the majority of dandelions, can reproduce sexually and presumed hybrids occur along the canal at Driffield where the chalk of the raised banks is adjacent to wet meadow land favoured by species of the other sections. Other areas for this section are the narrow belt of sandy soil along the northern edge of the Wolds and the band of Jurassic sands to the west. The vice-county does not possess links or dunes and the sands at Spurn have so far afforded only *T. oxoniense*. Ashy ground of the old Hull Docks has given *T. simile* and *T. argutum*.

Species of the Section Obliqua are found in mainly Scottish coastal areas and sand dunes and are quite unlikely to be present in VC 61. Those of Section Palustria are extremely rare in Britain, but since they are species of hay meadows and fens, and a few such habitats still remain in East Yorkshire, one lives in hope.

Section Spectabilia as now understood is represented in this area by *T. spectabile*. All six sites on which I have found it are wet meadows or pasture watered by streams coming from the chalk. This plant usually has at least a few purple blotches on the leaves whereas those of the next section are markedly blotched. They are *T. euryphyllum* and *T. pseudolarssonii* in Section Naevosa. The former seems also to favour sites with a basic water supply, but not so wet as those of *T. spectabile* whilst the latter, a plant of northern distribution, has been found in Holderness and particularly on the carrs north of the Wolds at Folkton.

Our commonest species of Section Celtica is *T. raunkiaeri* which occupies a variety of habitats from meadow to churchyard wall top at Foston-on-the-Wolds, usually well drained, thus reminding one that it was previously placed in Section Vulgaria. By contrast

the other members of Section Celtica prefer wet meadows. Section Hamata is one of the easiest to determine as a whole because the petioles and midribs are very finely striated with green and purple, though this applies to some Celtica species. The individual members are not always easy to distinguish. Most can be found on roadside verges, *T. hamatum* being one of the commonest lowland dandelions.

The remaining dandelion species belong to the large Section Vulgaria. They occupy a variety of sites though probably the commonest and most obvious is that of roadside verges. *T. aurosulum* is one that can often be picked out fairly easily because of the large capitula, 60–70 mm across. *T. ancistrolobum* is interesting in that it is easily recognized on rather bare roadsides by its few low-lying dull leaves with very few large broad leaf-lobes, yet it dominated a meadow by the R. Derwent near Menethorpe and there exhibited bright green upright growth.

Other examples of a single species being virtually the only dandelion apparently present are meadows near Bishop Wilton and Hunmanby with *T. brachyglossum* and *T. lacistophyllum* respectively and a cliff top at Barmston with *T. sellandii*. It would be good to discover whether this is due to human activity such as re-seeding pasture or a more natural phenomenon.

From the list given below it will be seen that a few sites are particularly rich in species. The water meadows near Melbourne have at least seven species and the meadows that are winter flooded near Withernwick may prove as fruitful. The carrs such as those at Folkton are also worth close examination. All in all the species of dandelions present can give a good indication of land that is botanically interesting, some of which might be well worth the consideration of conservationists.

Species List

The following list is compiled from sheets in the writer's herbarium. All records prior to 1983 were determined or confirmed by Dr A. J. Richards. Those collected subsequently and a few earlier ones were determined or confirmed by Mr C. C. Haworth as also were some species where taxonomic concepts had changed over the years. Grid references to 1 km squares are given without the initial letters since confusion cannot arise, e.g. Stillingfleet 59/41, the most westerly, is SE 594410 and Spurn 41/12 is Spurn Point TA 410120, the most easterly.

TARAXACUM Weber

Section ERYTHROSPERMA (R. Lindberg fil.) Dahlstedt

Throughout this section the habitat is well drained grassland on chalk or limestone unless otherwise stated.

T. argutum Dahlst. Hull docks 09/28 on ashes, 1979.

T. brachyglossum (Dahlst.) Raunk. Bishop Wilton 80/54, 1975; Scampston 85/75 sandy verge, 1976; Rudston 09/70 road dust, 1976; Speeton 15/75 pasture, 1976; N. Grimston 84/67, 1977; Kilham 06/64, 1977; Staxton 02/79 gravel, 1977.

T. fulviforme Dahlst. Wintringham 89/72, 1976; Langton 80/68, 1979.

T. lacistophyllum (Dahlst.) Raunk. Millington 81/51, 1976; Langton 80/68, 1980; Hunmanby 06/77, 1980.

T. oxoniense Dahlst. Westow 75/64 quarry, 1974; Acklam 79/61, 1975; Spurn 41/12 sand, 1976; N. Grimston 85/67 quarry, 1976; Langton 80/68, 1979.

T. proximum (Dahlst.) Raunk. Stillingfleet 59/41 wet grassland, 1979; Givendale 81/53, 1979.

T. rubicundum (Dahlst.) Dahlst. Fordon 05/75, 1976; Langton 80/68, 1979.

T. simile Raunk. Kelleythorpe 01/56 old railway ash, 1978; Wheldrake 66/46 woodland ride, 1979; Hull docks 09/28 ash, 1979; Langton 80/68, 1980.

Section OBLIQUA Dahlst. NIL

Section PALUSTRIA (H. Lindb. f.) Dahlst. NIL

Section SPECTABILIA (Dahlst.) Dahlst. emend. A. J. Richards

T. spectabile Dahlst. All on wet pasture or meadow with water from the chalk. S. Cliffe 87/35, 1975; Driffield 01/57, 1975; Wansford 04/56, 1975; Harpham 08/61, 1978; Folkton 05/80, 1979; Winteringham 87/73, 1980.

Section NAEVOSA. M. P. Christiansen

Habitat wet grassland unless otherwise stated.

T. euryphyllum (Dahlst.) M.P.Chr. Burton Fleming 87/73 verge, 1975; Kelleythorpe 01/55, 1978; Catton 7-/5-, 1979; Winteringham 87/73, 1980.

T. pseudolarssonii A. J. Richards Staxton 02/79 verge, 1973; Folkton 05/80, 1974; Driffield 03/56, 1975; Withernwick 20/39, 1980.

T. 'richardsianum' C. C. Haworth, inedit. Millington 83/53, 1976; Thixendale 81/61, 1979.

Section CELTICA A. J. Richards

Plants of wet pastures and hay meadows unless otherwise stated.

T. haematicum Haglund Bubwith 70/36, 1974; Kilham 06/64, 1977; Melbourne 73/45, 1977; Withernwick 20/39, 1980.

T. laetifrons Dahlst. Driffield 04/57, 1974.

T. nordstedtii Dahlst. Driffield 01/57, 1975; Spurn 41/12 sand, 1976; Kelleythorpe 01/55, 1978; Thixendale 81/61, 1979.

T. praestans H. Lindb. fil. Melbourne 73/45, 1976.

T. raunkiaeri Wiinstedt Ruston Parva 05/62 verge, 1975; Staxton 00/80, 1975; Folkton 06/79 verge, 1975; Leavening 79/63 grassland, 1975; Scampston 85/75 sandy verge, 1976; Rudston 09/70 road dust, 1976; Speeton 15/75 pasture, 1976; Flamborough 21/71 verge, 1976; Driffield 02/58 verge, 1977; Melbourne 73/45, 1977; Foston/Wolds 10/55 wall top, 1979.

Section HAMATA H. Øllgaard

The habitat is roadside verges unless otherwise stated.

T. boekmanii Borgvall Burton Agnes 12/61 ditch, 1975; Boynton 13/67 woodland ride, 1975; Staxton 02/79 gravel, 1977.

T. bracteatum Dahlst. Melbourne 73/45 hay meadow, 1977; Kelk 10/57, 1979.

T. hamatiforme Dahlst. N. Frodingham 08/53, 1979.

T. hamatum Raunk. Westow 75/64, 1974; Boynton 13/68, 1975; Bishop Wilton 80/54, 1975; Tunstall 30/30, 1976; Sherburn 96/74, 1978; Wetwang 92/59, 1979.

T. marklundii Palmgren Ruston Parva 07/62, 1975; Wansford 05/55, 1977; Skerne 04/54, 1977; Garton 98/59, 1977.

T. pseudohamatum Dahlst. Gransmoor 13/59, 1984.

T. quadrans H. Øllgaard Sledmere 95/61 woodland ride, 1979.

T. subhamatum M.P.Chr. Leconfield 00/43, 1977.

Section VULGARIA Dahlstedt

This large section has a variety of habitats, but roadside verges are the commonest or at least the most accessible and it is this habitat unless otherwise stated.

T. aequilobum Dahlst. Kelk 09/59, 1977; Wetwang 92/59, 1979.

T. alatum H. Lindb. f. Burythorpe 79/65, 1975; Carnaby 15/63, 1977.

T. ancistrolobum Dahlst. Folkton 05/80 pasture, 1975; Melbourne 73/45 hay meadow, 1976; Driffield 02/59, 1977; Brigham 08/54, 1979; Menethorpe 76/67 meadow, 1979.

T. aurosulum H. Lindb. f. Driffield 02/59, 1977; Folkton 05/80, 1977.

T. cordatum Palmgren Bubwith 70/36 hay meadow, 1975.

T. dahlstedtii H. Lindb. f. Wintringham 89/72, 1976; Hempholme 09/50 gravel quarry, 1979; Hull docks 10/28 ash, 1979.

T. expallidiforme Dahlst. Driffield 02/57 foot of wall, 1978.

T. fasciatum Dahlst. Bishop Wilton 79/54, 1975.

T. huelphersianum Dahlst. Burton Fleming 08/71, 1979.

T. insigne Ekman ex Chr. & Wiinst. in Raunk. Garton 99/58, 1977; Brigham 08/54, 1979; Muston 07/79 meadow, 1981.
T. interveniens Haglund Burton Fleming 06/72 tumulus, 1976.
T. lingulatum Marklund Driffield 01/60, 1977; Hutton Cranswick 01/53 road dust, 1978; Withernwick 20/39 meadow, 1980.
T. ochrochlorum Haglund Kelk 09/59, 1979.
T. ostenfeldii Raunk. Winteringham 87/73, 1980.
T. pachymerum Haglund Boynton 13/67 woodland ride, 1975; Hempholme 09/50 gravel quarry, 1979.
T. pannucium Dahlst. Melbourne 73/45 meadow, 1977; Driffield 02/58 hedge base, 1979.
T. planum Raunk. Scampston 87/75, 1976.
T. polyodon Dahlst. Boynton 13/67 woodland ride, 1975; Scampston 87/75, 1976; Driffield 02/58, 1977 and 1979; Folkton 05/81 pasture, 1978; Barmston 17/60 sand on low cliff top, 1979.
T. sagittipotens Dahlst. & R. Ohlsén Driffield 02/58, 1977.
T. sellandii Dahlst. Melbourne 73/44 cart-track, 1976; Barmston 17/59 cliff top, 1980.
T. stenacrum Dahlst. Driffield 02/58, 1979.
T. subcyanolepis M.P.Chr. ex M.F.Chr. & Wiinst. Melbourne 73/44 cart-track, 1976.
T. subundulatum Dahlst. Melbourne 73/45 meadow, 1977; Withernwick 20/39 meadow, 1980.
T. trilobatum Palmgren Withernwick 18/39 meadow, 1981.
T. xanthostigma H. Lindb. f. Driffield 02/58 field path, 1977.

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BOOK REVIEW

From Agar to Zenry by **Ron Freethy**. Pp. 152, with 90 black and white illustrations. The Cawood Press, 1985. £9.95.

This is described as a book of plant uses, names and folklore. Despite the title, it is no mere alphabetical list of plants, but an original approach to the subject. It contains a fascinating collection of information about plant species, arranged according to habitat and including seaweeds, fungi, ferns, herbs and trees.

After a short but wise note to the reader, the author, who is well known for his writings and broadcasts, explains that much of his knowledge and love of flowers and folklore comes from his great-grandmother, who lived to be 104 (described as the little witch who had green cunning). The book therefore contains facts gained through personal experience, as well as well-researched information. There are herbal and culinary uses of plants, local names, uses of timber, and traditional crafts such as basketry, besom making and thatching. A comprehensive bibliography is added.

The publication is enhanced by the drawings of Carole Pugh and it is a book to be enjoyed and referred to time and again. Most people will recognize Agar, but as to the meaning of Zenry — that is just one of many things for the reader to discover.

JED

THE SHORT-EARED OWL

Of recent years, sightings of short-eared owls in Yorkshire have been more frequent than they were earlier this century. Although that may be partially accounted for by the rapid growth in the number of observers, there is evidence that both as a resident and visitor, this species has increased in the county. There are now more opportunities to watch the males in display-flight over marsh and moor in spring. As they circle around on extended wings with occasional down-beats, the cocks sing their hollow, hooting songs. At intervals the wingtips are brought together beneath the flying bird's body, to make a rapid series of claps. When that occurs the displaying male drops several feet, before regaining its buoyancy with a down-stroke of its long, narrow wings.

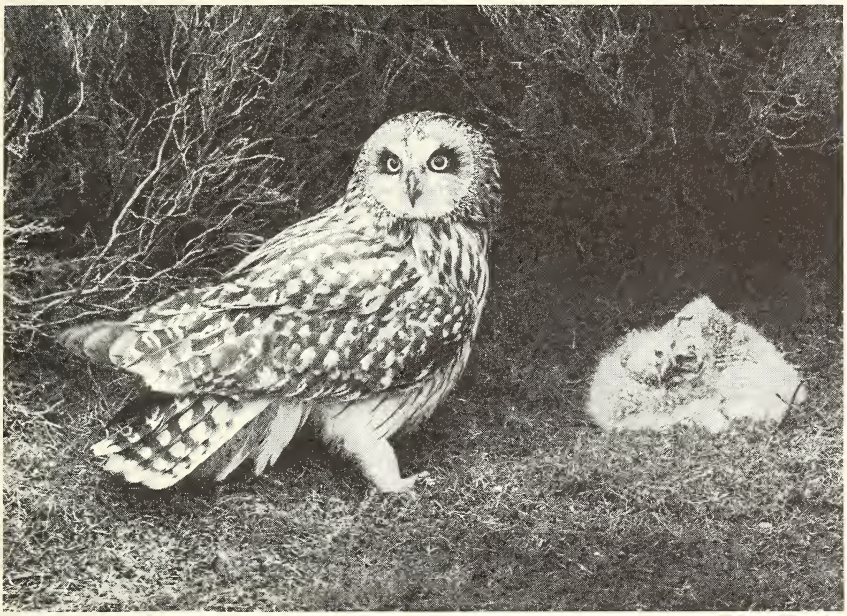

Photo: Arthur Gilpin

ENTOMOLOGICAL REPORTS FOR 1972–1985
COLEOPTERA: PART 3, STAPHYLINIDAE (ALEOCHARINAE)

M. L. DENTON

This part follows Part 2 (*Naturalist* **111**: 25–30) and completes the Coleoptera Report. Unlike most of the order covered by the previous Coleoptera Reports, the Aleocharinae cannot be said to have been overworked. The members of this sub-family are generally very small and can be notoriously difficult to identify, and in most cases there is a necessity to dissect the internal organs for positive identification. Consequently very few coleopterists have become seriously involved with the group.

However, Mr E. W. Aubrook's work continued into the 1970s and the rewards of his searchings were to discover a few species new to VC 62, 63 and 64 along with six new additions to the county. The interest shown by Mr R. J. Marsh during the 1980s has also

supplemented the respective vice-county total lists and several hitherto undiscovered Yorkshire species have been located. Additionally, through the activities of Mr E. J. Smith of Sheffield, the writer became interested in their identification during the 1980s.

Ever since Mr D. Maude commenced his mammoth invertebrate survey of the Huddersfield area in 1983, there has been a plethora of specimens for identification. This task has been undertaken by the writer, who must acknowledge the help and advice so freely given by Mr C. Johnson when determining some of the more problematical specimens. Not only have there been innumerable new vice-county records stemming from this survey but several new species have been added to the known fauna of the county.

With the exception of the above-named coleopterists, very few have become actively involved with the group, although due to the availability of various identification papers it is hoped that more people will become interested in this absorbing, albeit difficult, sub-family. It must be borne in mind that very little work has been carried out on this sub-family; therefore the following records show the distribution of interested coleopterists and not necessarily of the species itself. However, the following can be described as being very local and of rare occurrence: *Gymnusa brevicollis*, *G. variegata*, *Bolitochara bella*, *Gnypeta rubrior*, *Nototheca confusa*, *Plataraea brunnea*, *Atheta diversa*, *Thamiarea cinnamomea*, *Ocalia badia*, *Oxypoda longipes*, *O. nigricornis* and *O. procerula*.

Due to the problems of identification and taxonomy which govern this sub-family, it has been thought best to indicate the sex of the specimen(s) on which identification was based, as generally speaking the aedeagus of the male is a better character than the spermatheca of the female. This will give a better indication of the validity of the records if they are assessed by future researchers. In all the following instances the specimens concerned were male, unless otherwise stated.

Initials used in the list that follows are those of E. W. Aubrook, M. L. Denton, W. A. Ely, J. H. Flint, C. Johnson, H. R. Last, R. J. Marsh, D. Maude, E. J. Smith and P. Skidmore.

† New county records * New vice-county records

Gymnusa brevicollis Pk. (*63) Ox-Lee (SE10), not sexed, 16/2/85; D.M. det. M.L.D.

G. variegata Kies. (*63) Skirden Clough (SE03), sex ?, 9/7/83; W.A.E. New Mill (SE10), not sexed, 10/1/85; D.M. det. M.L.D. Whitley Common (SE10), not sexed, 17/2/85; D.M. det. M.L.D.

†*Cypha punctum* Mots. (62) Ashberry Pastures (SE58), both sexes, 29/9/72; E.W.A.

C. pulicarius Er. (*63) Morton Wood (SE10), not sexed, 19/6/85; D.M. det. M.L.D. The only previous records are from Mulgrave Wood (NZ81) in 1934 and Dunnington Common (SE75) in 1971.

Oligota apicata Er. (*63) Anston Stones Wood (SK58), sex ?, 19/5/85; W.A.E. The only previous records are from Scarborough (TA08) and Whitby (NZ81) some 50 years ago.

O. parva Kra. (63) Barrow Hills (SK69), not sexed, 24/5/83, leaf litter; R.J.M. Sprotbrough (SE50), not sexed, 18/8/84, leaf litter; R.J.M. Melton Wood (SE50), not sexed, 9/9/85, grass cuttings; R.J.M. Torne Bridge (SE60) and Wheldrake (SE64) have yielded the only previous records.

Myllaena brevicornis Matt. (*63) Hey Clough (SE00), 16/4/83; M.L.D. Marsden Clough (SE00), 18/6/83; M.L.D. Broadhead Clough (SD92), 20/3/84; M.L.D. Thrybergh (SK49), female, 6/7/85; E.J.S. Porkgate Canal (SK49), both sexes, 13/7/85; E.J.S. Elland Park Wood (SE12), 21/9/85; E.J.S.

M. dubia Gr. (63) Porkgate Canal (SK49), 13/7/85; E.J.S.

M. infuscata Kr. (*62) Ashberry Pastures (SE58), sex ?, 29/9/72; E.W.A. (63) Sprotbrough (SE50), sex ?, 29/6/72; E.W.A. Bretton (SE21) and Askham Bog (SE54) have yielded the only previous records.

†*M. minuta* Gr. (63) Sprotbrough (SE50), sex ?, 26/3/71; E.W.A. (64) Knaresborough Ringing Station (SE35), female, 21/8/83; M.L.D. (teste C.J.).

Encephalus complicans Steph. (*63) Netherton (SE11), 3/3/84; D.M. det. M.L.D. Honley Wood (SE11), 8/12/84; M.L.D. Langold Holt (SK58), 14/7/85; E.J.S.

Cyrophaena bihamata Thom. (63) Thorne Moor (SE71), female, 27/4/85; E.J.S. (teste H.R.L.). The only previous records are from Skipwith (SE63) and Torne Bridge (SE60).

G. latissima Steph. (*64) Askham Bog (SE54), sex ?, 4/10/71; E.W.A.

†*G. williamsi* Strand. (63) Bottom's Mill Wood (SE10), 20/6/85; D.M. det. M.L.D. (64) Harlow Carr (SE25), both sexes, 24/9/72; E.W.A.

Homalota plana Gyll. (63) Hepworth (SE10), 16/6/85; D.M. det. M.L.D.

Leptusa pulchella Mann. (62) Duncombe Park (SE68), female, 10/9/85, leaf litter; R.J.M. (teste C.J.). (*63) Crimpsall Ings (SE50), female, 23/8/85, reed litter; R.J.M. (teste C.J.). The only previous record was from Mulgrave Wood (NZ81) in 1936.

L. ruficollis Er. (*63) Mollicar Wood (SE11), sex ?, 7/9/73, under birch bark; E.W.A.

Bolitochara bella Mark. (*63) Lepton Great Wood (SE11), not sexed, 7/7/85; D.M. det. M.L.D. (teste C.J.). The only previous record was from Malham (SD86) in 1957.

†*Autalia impressa* Ol. All past records of this species are dubious as the species which follows has been found to be masquerading under this name. The following authenticated records are therefore the first to find their way onto the Union's record cards. (62) Arnecliffe Wood (SE49), 15/9/72; E.W.A. Duncombe Park (SE68), 10/9/85; R.J.M. (63) Ewden Beck (SK29), 1/10/74; C.J. Melton Wood (SE50), 15/9/81; R.J.M. Potteric Carr (SE50), 11/6/83; M.L.D. North Dean Wood (SE02), 17/6/83; M.L.D. Broadhead Clough (SD92), 4/9/83: R.J.M. Wharncliffe Wood (SK29), 18/9/83; E.J.S. Rocker Rocks (SK29), 7/10/84; E.J.S. Sprotbrough (SE50), 23/8/85; R.J.M. Royd Edge Clough (SE00) 21/9/85; D.M. det. M.L.D. (64) Bishop Wood (SE53), 15/10/80; R.J.M. Timble Ings (SE25), 19/8/84; R.J.M.

†*A. longicornis* Sch. (63) Langsett (SE20), 20/8/85; E.J.S. Elland Park Wood (SE12), 21/9/85; W.A.E. & E.J.S.

A. puncticollis Sharp. (*65) Rowton Beck (NY92), sex ?, 20/6/81; P.S.

Cordalia obscura Gr. (*63) Mag Wood (SE11), 27/11/83; D.M. det. M.L.D.

Falagria caesa Er. (*63) Royd House Wood (SE11), not sexed, 25/11/84; D.M. det. M.L.D. Blackmoorfoot (SE01), not sexed, 9/9/85; M.L.D.

Tachyusa leucopus Marsh. (*63) Blackmoorfoot (SE01), not sexed, 23/4/83; M.L.D. Salt Spring Wood (SK29), female, 21/11/83; E.J.S. (teste C.J.).

Gnypeta rubrior Tott. (*63) Blackmoorfoot (SE01), 29/11/84; M.L.D. det. C.J.

Callicerus obscurus Gr. (*63) Boothferry Bridge (SE72), sex ?, 23/3/72; E.W.A.

†*Schistoglossa curtipennis* Sharp. (63) Deer Hill (SE01), 13/3/83; M.L.D. Yateholme (SE10), 25/1/85; D.M. det. M.L.D. Hades (SE10), 3/2/85; D.M. det. M.L.D. along with a few additional records from the Yateholme area (SE10) during 1985.

†*S. gemina* Er. (63) Rushy Moor (SE51), female, 7/5/85, in tussocks; R.J.M. (teste C.J.). (64) Askham Bog (SE54), sex ?, 9/12/71; E.W.A.

Amischa cavifrons Sharp. (*63) Fitzwilliam Canal (SK49), female, 13/7/85; E.J.S. Porkgate Canal (SK49), female, 13/7/85; E.J.S.

A. decipiens Sharp. (*63) Sprotbrough (SE50), female, 9/4/84, in reed bed; R.J.M. (teste C.J.). Rawcliffe Moor (SE71), female, 17/4/85; E.J.S. Langold Holt (SK58), female, 30/6/85; R.J.M. All previous records have been from VC 61.

A. soror Kra. (*63) Melton Wood (SE50), female, 14/4/83, leaf litter; R.J.M. (teste C.J.). Sprotbrough (SE50), female, 8/3/85, grass tussocks; R.J.M. (teste C.J.). Langold Holt (SK58), female, 30/6/85; W.A.E. The only previous record was from North Duffield (SE63) in 1930.

Nehemitropia sordida Marsh. (*63) Dean Wood (SE11), 24/11/84; D.M. det. M.L.D. (teste C.J.).

†*Notothecta confusa* Mark. (63) Hall Dike (SE11), not sexed, 17/12/83; D.M. det. M.L.D. (teste C.J.).

Dinaraea linearis Gr. (63) Melton Wood (SE50), female, 14/7/82, leaf litter; R.J.M. (teste C.J.). The only previous record was from Shirley Pool (SE51).

Plataraea brunnea F. (62) Duncombe Park (SE68), female, 10/9/85, old logs; R.J.M. (teste C.J.). (*63) Sinking Wood (SE10), female, 18/6/85; D.M. det. M.L.D. (teste C.J.).

Liogluta granigera Kies. (63) Holmbridge (SE10), both sexes, 24/8/73; C.J. Mollicar Wood (SE11), sex ?, 7/9/73; E.W.A. Ewden Beck (SK29), female, 1/10/74; C.J. Greno Wood (SK39), 1/10/74; C.J. (*64) Malham (SD86), female, 27/9/72; C.J. The only previous records are from Millhouses (SE40) in 1919 and Robin Hood's Bay (NZ90) in 1921.

L. nitidula Kra. (*63) Langsett (SE20), female, 21/9/84; E.J.S. Langsett (SE20), 2/3/85; D.M. det. M.L.D. The only previous records are from Keld (NY80) in 1915 and Kildale (NZ60) in 1916.

Atheta britteni Joy. (*63) Edderthorpe Ings (SE40), sex ?, 2/2/71; E.W.A.

†*A. debilis* Er. (63) Salterhebble (SE02), 27/10/84; M.L.D. Dobb Dike (SE10), 17/2/85; M.L.D. Slaithwaite (SE01), 20/10/85; D.M. det. M.L.D.

A. elongatula Gr. (*61) Holme upon Spalding Moor (SE83), both sexes, 4/7/81; W.A.E. (teste C.J.). (63) Deer Hill (SE01), 16/6/84; M.L.D. Langold Holt (SK58), 14/7/84; E.J.S. Hollins Hill (SE10), 16/2/85; D.M. det. M.L.D. Blackmoorfoot (SE01), 5/5/85; M.L.D. The only previous record was from Thorne Moor (SE71) in 1971.

A. malleus Joy. (*62) Ashberry Pastures (SE58), 29/9/72; E.W.A. (*63) Grange Park (SK39), 2/7/81; W.A.E. Sprotbrough (SE50), 16/5/84; R.J.M. (teste C.J.). Brecks Plank (SK49), 7/10/84; W.A.E. (teste M.L.D.). Thrybergh (SK49), 6/7/85; E.J.S. Fitzwilliam Canal (SK49), 13/7/85; E.J.S. The only previous record was from Bubwith (SE73) nearly 60 years ago.

A. melanocera Thom. (*63) Blackmoorfoot (SE01), 30/4/83; M.L.D. Elland gravel pit (SE12), 1/3/84; M.L.D. Sprotbrough (SE50), 5/5/84, reed bed; R.J.M. (teste C.J.). Mag Wood (SE11), 17/5/84; D.M. det. M.L.D. along with a few other records south of Holmfirth (SE10) during 1984.

A. obtusangula Joy. (63) Broadhead Clough (SD92), 28/3/84; M.L.D. Rocker Rocks (SK29), 30/12/84; E.J.S. Slaithwaite (SE01), 20/10/85; D.M. det. M.L.D. Gunthwaite (SE20), Bubwith (SE73) and Sawley (SE26) have yielded the only previous records.

A. volans Scriba. (*63) Shepley (SE10), sex ?, 16/12/71; E.W.A. Treeton Dyke (SK48), 29/7/81; W.A.E. det. M.L.D. The only previous records are from Scarborough (TA08), Hornsea Mere (TA14) and Spurn (TA41).

A. luteipes Er. (*63) Blaxton Common (SE60), female, 28/6/71; C.J. Spurn (TA41), Scarborough (TA08), Bubwith (SE73) and Bolton Percy (SE54) have yielded the only previous records.

A. exellens Kra. (*63) Gorple (SD93), 2/10/83; M.L.D. Blackmoorfoot (SE01), 28/10/84; M.L.D. (teste C.J.). The only previous records are from Studley (SE27) in 1867, Scarborough (TA08) in 1928, Malham (SD86) in 1967 and Penyghent (SD87) in 1967.

†*A. fungivora* Thom. (63) Lepton Great Wood (SE11), 28/10/84; D.M. det. M.L.D. (teste C.J.).

A. monticola Thom. (*63) Blackmoorfoot (SE01), 6/8/83; M.L.D. Lepton Great Wood (SE11), 7/9/85; D.M. det. M.L.D. The only previous record was from Scarborough (TA08) in 1928.

†*A. harwoodi* Will. (61) Wheldrake (SE64), sex ?, 24/10/71; E.W.A. (63) Shepley (SE10), sex ?, 16/12/71; E.W.A. Blackmoorfoot (SE01), 8/8/83; M.L.D. (teste C.J.).

†*A. liturata* Steph. (62) Duncombe Park (SE68), 10/9/85, in *Polyporus sulphureus*; R.J.M. (teste C.J.).

A. corvina Thom. (62) Duncombe Park (SE68), female, 10/9/85, in *Polyporus sulphureus*; R.J.M. (teste C.J.). (*63) Farnley Line (SE11), sex ?, 15/3/73, old cut grass; E.W.A. The only previous records are from Raincliffe Wood (SE98) in 1931 and Givendale (SE88) in 1935.

†*A. cadaverina* Bris. (63) Langsett (SE20), 21/9/84 and 20/10/85; E.J.S.

†*A. ampicollis* Mul. & Rey. (63) Digley (SE10), 24/7/85; D.M. det. M.L.D. (teste C.J.).

A. aterrima Gr. (*64) Knaresborough Ringing Station (SE35), 25/4/83; M.L.D. (teste C.J.).

†*A. exigua* Er. (63) Holme Moss (SE00), sex ?, 1983; C.J.

A. pygmaea Gr. (*62) Arnecliffe Wood (SE49), both sexes, 15/9/72; E.W.A.

A. subsinuata Er. (*61) Boynton (TA16), sex ?, 6/5/72; E.W.A. (63) Almondbury (SE11), 9/9/85; M.L.D. Birstall (SE22), North Stainley (SE27) and Pickering (SE78) have yielded the only previous records.

A. celata Er. (*63) Mag Dale (SE11), 3 and 11/84; D.M. det. M.L.D. Melton Wood (SE50), both sexes, 15/4/85, dung; R.J.M. (teste C.J.). March Haigh (SE01), 6/5/85; D.M. det. M.L.D. Thrybergh (SK49), both sexes, 6/7/85; E.J.S. Blackmoorfoot (SE01), 25/7/85; M.L.D.

†*A. dadopora* Thom. (63) Melton Wood (SE50), 8/7/85, old cut grass; R.J.M. (teste C.J.).

A. sordidula Gr. (*63) Shepley (SE10), sex ?, 16/12/71; E.W.A. The only previous records are from Bubwith (SE73), Spurn (TA41), Whitby (NZ81) and Malham (SD86).

A. aquatilis Thom. (*63) Hall Dike (SE11), female, 18/2/84; D.M. det. M.L.D. Dean Wood (SE11), female, 29/5/84; D.M. det. M.L.D. Blackmoorfoot (SE01), 28/10/84; M.L.D. Additionally several specimens were collected from scattered localities in SE10 and SE11 during 1985. The only previous records are from Hayburn Wyke (TA09) and Forge Valley (SE98) nearly 60 years ago.

A. brunneipennis Thom. (*63) Langold Holt (SK58), both sexes, 14/7/84; E.J.S. Dobb Dike (SE10), 16/8/85; D.M. det. M.L.D. Langsett (SE20), both sexes, 20/10/85; E.J.S. Ripon (SE37) and Malham (SD86) have yielded the only previous records.

A. castanoptera Mann. (*63) Mag Dale (SE11), 11/3/84; D.M. det. M.L.D. Langsett (SE20), female, 21/9/84; E.J.S. Elland gravel pit (SE12), 25/11/84; M.L.D. Dobb Dike (SE10), 17/2/85; D.M. det. M.L.D. Wickersley Wood (SK49), both sexes, 17/7/85; W.A.E. det. M.L.D. Blackmoorfoot (SE01), 13/11/85; M.L.D.

A. triangulum Kr. (*64) Hunsingore (SE45), sex ?, 14/10/71; E.W.A.

A. xanthopus Thom. (*63) Melton Wood (SE50), female, 15/10/79, leaf litter, R.J.M. (teste C.J.). South Crosland (SE11), 25/11/83; D.M. det. M.L.D. Marsden Clough (SE00), female, 9/3/84; M.L.D. Digley (SE10), female, 9/3/84; M.L.D. Dean Plantation (SK49), female, 5/5/85; W.A.E. det. M.L.D.

†*A. basicornis* Mul. &. Rey. (63) Thorne Moor (SE71), female, 27/4/85, leaf litter, R.J.M. (teste C.J.).

†*A. diversa* Sharp. (63) Wessenden Head (SE00), 16/6/84, sheep dung; M.L.D. (teste C.J.).

A. repanda Mul. & Rey. (*63) Dean Wood (SE11), 29/5/84; D.M. det. M.L.D.

A. ischnocera Thom. (*63) Shepley (SE10), sex ?, 16/12/71; E.W.A. Netherton (SE11), 3/3/84; M.L.D. Broadhead Clough (SD92), female, 16/6/84; M.L.D. Blackmoorfoot (SE11), female, 16/8/84; M.L.D. Spurn (TA41) and Malham (SD86) have yielded the only previous records.

A. macrocera Thom. (*63) Deffer Wood (SE20), 18/8/85; D.M. det. M.L.D.

A. marcida Er. (*63) North Dean Wood (SE02), 22/10/83; M.L.D. Hall Dike (SE11), 15/2/84; D.M. det. M.L.D. along with several other records from the Huddersfield area (SE11) during 1984. The only previous records are from Givendale (SE88) in 1925 and Mulgrave Wood (NZ81) in 1936.

A. nigripes Thom. (61) Wheldrake (SE64), sex ?, 9/5/71; E.W.A. (*63) Bretton (SE21), sex ?, 7/2/71; E.W.A. Shepley (SE10), sex ?, 16/12/71; E.W.A. Bentley Springs (SE11), 16/4/72; E.W.A. Morton Wood (SE10), 31/1/85; D.M. det. M.L.D. (*64) Catrigg Force (SD86), 11/5/85; M.L.D. The only previous record was from Spurn (TA41).

A. setigera Sharp. (*63) Lindley Wood (SE20), female, 14/3/84; E.J.S. The only previous records are from Spurn (TA41) in 1948 and Malham (SD86) in 1954.

Alianta incana Er. (63) Mag Dale (SE11), 5 and 11/84 and 7/85; D.M. det. M.L.D. Langold Holt (SK58), 14/7/84; W.A.E. det. M.L.D. Melton Wood (SE50), both sexes, 16/5/85, reed bed; R.J.M. (teste C.J.). Scarborough (TA08), Askham Bog (SE54), Blaxton Common (SE60) and Secker Vale (SE31) have yielded the only previous records.

†*Thamiarea cinnamonea* Gr. (63) Blackmoorfoot (SE01), not sexed, 11/11/85; M.L.D. (teste C.J.).

Calodera nigrita Mann. (*63) Thorne Moor (SE71), 27/4/85; E.J.S. (teste C.J.). (*64) Bishop Wood (SE53), 18/4/83, grass cuttings; R.J.M. (teste C.J.). The only previous records are from Scarborough (TA08) and Thorganby (SE64).

C. riparia Er. (63) Thorne Moor (SE71), 27/4/85; E.J.S. (teste C.J.). Scarborough (TA08), Bubwith (SE73) and Askham Bog (SE54) have yielded the only previous records.

Chiloporata rubicunda Er. (62) Duncombe Park (SE68), 18/6/83, leaf litter; R.J.M. The only previous record was from Scarborough (TA08).

Ocalea badia Er. (*63) Upper Windleden (SE10), 5/4/85; D.M. det. M.L.D. The only previous records are from Forge Valley (SE98) in 1926 and Tadcaster (SE44) in 1969.

O. latipennis Sharp. (*63) Langsett (SE20), 7/4/85; D.M. det. M.L.D. Scarborough (TA08), Bingley (SE13) and Raincliffe Wood (SE98) have yielded the only previous records.

O. picata Steph. (*63) Hall Dike (SE11), 17/12/83; D.M. det. M.L.D. Elland gravel pit (SE12), 9/9/84; M.L.D. Upperhead Dyke (SE10), 24/2/85; D.M. det. C.J. Slaithwaite (SE01), 20/10/85; D.M. det. M.L.D.

Oxypoda amoena Fair. & Lab. (*63) Hade Edge (SE10), 22/2/85; D.M. det. M.L.D. The only previous record is from Spurn (TA41).

O. lividipennis Mann. (*63) Wharncliffe Wood (SK29), both sexes, 16/6/85; E.J.S.

O. longipes Mul. & Rey. (*63) Mag Wood (SE11), not sexed, 27/11/83; D.M. det. M.L.D. (teste C.J.). The only previous record was from Bubwith (SE73) in 1916.

O. nigricornis Mots. (*63) Brun Moor (SE00), female, 14/9/85; D.M. det. M.L.D. (teste C.J.). The only previous record was from Malham (SD86) in 1967.

O. procerula Mann. (*63) Bretton (SE21), sex ?, 16/4/72; E.W.A. Elland gravel pit (SE12), not sexed, 19/2/83; M.L.D. (teste C.J.) along with records from four localities near Huddersfield (SE11) during 1985. The only previous record was from Askham Bog (SE54) in 1967.

O. umbrata Gyll. (*63) Honley Wood (SE11), 17/5/84; M.L.D. Whitley Common (SE10), 17/2/85; M.L.D. (teste C.J.). March Haigh (SE01), 6/5/85; D.M. det. M.L.D. Crowden Great Brook (SE00), 1/6/85; D.M. det. M.L.D.

Ischnoglossa prolixa Gr. (*63) Elland Park Wood (SE12), 22/9/85; M.L.D.

Haploglossa pulla Gyll. (*63) Honley Wood (SE11), not sexed, 17/5/84; D.M. det. M.L.D. (teste C.J.).

Aleochara algarum Fauv. (*62) Hayburn Wyke (TA09), sex ?, 24/4/82; J.H.F.

†*A. brevipennis* Gr. (63) Bretton (SE21), not sexed, 17/7/81; M.L.D.

A. curtula Goez. (*63) Sprotbrough (SE50), female, 23/6/83, carrion; R.J.M. Elland gravel pit (SE12), both sexes, 25/9/83, carrion; M.L.D. Blackmoorfoot (SE01), 20/6/84; M.L.D. Hall Dike (SE11), 21/7/84; D.M. det. M.L.D. Crowden Great Brook (SE00), 1/6/85; D.M. det. M.L.D. Upper Windleden (SE10), 11/7/85; D.M. det. M.L.D. March Haigh (SE01), 28/9/85; D.M. det. M.L.D.

†*A. lata* Gr. (62) Cat Babbleton (SE97), 22/6/85; W.A.E. (63) Sandbeck Park (SK59), not sexed, 4/7/81; W.A.E. Rainsborough Park (SK39), 10/5/85; W.A.E.

A. ruficornis Gr. (*61) Filey (TA18), not sexed, 15/5/82; M.L.D. (*63) Crowden Great Brook (SE00), not sexed, 25/5/85; D.M. det. M.L.D.

A. sparsa Heer. (*63) Dobb Dike (SE00), 17/2/85; D.M. det. M.L.D.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1985

compiled by

H. S. PELLANT and C. PELLANT

APPLETON LE MOORS (VC62), 25 May (Dr M. A. Atherden)

Demonstrating the lateness of the spring, Violets, Primroses and Celandines were still in full bloom when Union members visited Cropton Banks Wood, near Appleton le Moors, on Saturday 25 May, accompanied by members of the Woodland History Group of the Yorkshire Philosophical Society. A total of nearly 80 people converged upon Appleton Mill Farm, where they were greeted and shown round by Mr and Mrs Allison. During the day woodlands on both sides of the valley of the River Seven were visited. The steep sides of the valley are carved in limestones and calcareous grits of the Upper Jurassic Corallian Series, while the valley floor is covered with recent alluvium. The area is a Site of Special Scientific Interest (SSSI), and the woodland management policy is to maintain and improve the deciduous woodlands in cooperation with the Nature Conservancy Council. There was ample evidence of former coppicing, and some very old stools of Hazel, Lime and Sycamore were seen. New coppicing is being carried out in places, designed to let more light into the woodland to benefit the ground flora. Despite the late spring and a cloudy day, a good range of wildlife was recorded.

Ornithology (A. J. Wallis)

Appleton Mill Farm stands on the bank of the River Seven, which flows at this point through a fairly wide agricultural valley with steep wooded sides. Hell Bank Wood is on the west side and Cropton Bank Woods on the east. Lists of birds recorded comprised 13 species in and around the farm, 16 species in Hell Bank Wood, and 19 in Cropton Bank Wood and along its top edge. With some species seen in both areas of woodland, the actual total of different species recorded was 38.

In the farm area a Pied Wagtail was seen carrying food towards the farm buildings, and a Grey Wagtail flew rapidly downstream. A Kestrel flew south in a series of widening circles above the valley floor. Throughout the day considerable numbers of Swifts were seen feeding in the valley, no doubt having moved upstream from Sinnington village, four or five miles to the south. An empty Long-tailed Tit's nest of this year's construction was found.

In Hell Bank Wood four warblers were heard singing, Willow Warbler, Blackcap, Garden Warbler and Chiffchaff, though only the Willow Warbler indicated the presence of more than one male. Two Redstarts were singing, and a pair of Nuthatches were watched visiting their nesting hole. Both Marsh and Willow Tit were noted, but no other tits, and two Great Spotted Woodpeckers were heard calling. A juvenile Dipper, just fledged, was seen by the River Seven below the wood. A Tawny Owl was flushed from its roosting tree.

A Treecreeper's nest with six young was found in a familiar site in Cropton Bank Wood, behind a piece of loose bark still hanging to the trunk of a dead Ash tree. Later in the day the nest was found to have been pulled out, but whether by human or mammalian disturbance is not known. Two other Treecreepers were heard singing in the wood, as were another two Redstarts, and a Wood Warbler was calling. Although one Tree Pipit was reported to have been heard, the absence of this species in the valley, which would appear to be a very suitable area for it, was most noticeable. One Sparrowhawk was seen.

This was an interesting day, but not as rewarding as was to be expected from such a very attractive area. Perhaps some species were not singing, and were thus overlooked, if not seen.

Mollusca (A. Norris)

Thirty-six species of mollusca were found in the area of Cropton Banks Wood and Howlgate Head Wood, including several of Yorkshire's more localized species. These

included the slug *Limax cinereoniger* and *Zenobiella subrufescens*. The most interesting finds, however, were *Boettgerilla pallens* and a single dead shell of *Helicigona lapicida*.

The slug *B. pallens* was found under stones near an open barn close to the river. This is the first record of this species from North-east Yorkshire, constituting a new vice-county record. The occurrence of *H. lapicida* in Cropton Banks Wood is important, as it is the first indication that this species still occurs in this part of Yorkshire, all previous records from VC 62 dating back to the 1880s.

Entomology (K. Payne)

The meeting must be considered very successful from the entomological point of view, yielding some very interesting insects. Further and possibly even more interesting records may result when the more critical material has been studied in detail. Messrs M. L. Denton, W. A. Ely and P. Kendall have listed a total of 90 species taken, the most noteworthy of which are given below. A dead rabbit yielded eight species to Messrs Denton and Kendall.

Mr G. King compiled a list of 26 species taken at the meeting, including the Longhorn beetle *Leiopus nebulosus*, the Tachinid fly *Gymnochaeta viridis*, and three Chironomid flies identified by exuviae: *Prodiamesa olivacea*, *Chiponomus anthracinus* and *Orthocladius rivulorum*.

PLECOPTERA

Nemoura avicularis: this species, taken by Dr Lloyd Evans, is commonly associated with lake-shore habitats, but Yorkshire records prove that this is not always the case.

HEMIPTERA

Troilus luridus: this conspicuous insect is rarely recorded in Yorkshire. Strensall Common in 1973 may be the only previous VC 62 record.

COLEOPTERA

Cychrus caraboides: an interesting species, frequent in Yorkshire, showing elongated head and jaws suited to predation on snails.

Oreodytes sanmarki: this species, classified as 'boreo-montane' in continental Europe, is frequently found in very fast-flowing water.

Oiceoptoma thoracicum: a local species, found in the dead rabbit.

Eusphalerum primulae: plentiful in Primrose flowers.

Philonthus addendus: an uncommon species, found in the dead rabbit.

Nudobius lentus: found under conifer bark, its normal daytime habitat, this is a very local species.

Aleochara curtula: a local species, found in the dead rabbit.

A. ruficornis: several dozen were found in the dead rabbit. This appears to be a rare species in continental Europe as well as in Great Britain.

Corticeus bicolor: this was taken under bark. It is recorded as very local under the bark of broad-leaved trees, especially Elm, and has also been reported from the fungus *Daldinia concentrica*, which usually grows on Ash.

Orsodacne cerasi: an uncommon species, whose larvae feed on Rosaceae.

Chrysomela aenea: in recent years this has been found plentifully on its food plant, Alder, in various VC 62 localities, but on this meeting it was found away from this plant.

Apion pallipes: the larvae live in the stems of *Mercurialis perennis*, from which plant the adults can be swept.

Rhynchites cavifrons: an uncommon species, whose larvae develop in young Oak twigs.

R. aequatus: another uncommon species, found on Rosaceae.

HYMENOPTERA

Phaeogenes fuscicornis: the fifth Yorkshire record, new to VC 62.

Ophion ventricosus: several specimens were taken, making this the fourth Yorkshire locality.

Saphonecrus connatus: this species lives in the galls of other *Cynipidae*.

DIPTERA

Limonia nigropunctata: this is the second Yorkshire record, advancing the known distribution of this mainly southern species 100 km northwards.

Tephritis hyoscyami: an uncommon species, whose larvae live in Thistle flowers.

Lepidoptera (A. Heron)

In spite of the varied and promising habitat at Cropton Banks Wood, very few Lepidoptera were recorded, the day being dull, damp, cool and windy, after a thunderstorm on the previous evening. Only two butterflies were seen: Small White, *Pieris rapae*, and Orange Tip, *Anthocharis cardamines*. Four species of macro moth and two species of micro moth (long-horned moths of the *Adella* group) were recorded, in addition to larvae of three species of moth.

Arachnology (C. J. Smith)

The arachnifauna on either side of the River Seven was uniform and typical of deciduous woodlands. Thirty-four species were recorded, including 16 new to square SE 78. Two call for special mention: *Anyphaena accentuata* ♂ ♀ were taken from Gorse, only the seventh Yorkshire record since 1950; and *Pachygnatha listeri* ♂ was associated with the leaf litter under *Mercurialis perennis*, the twelfth record in the county since 1950. Both these species are found more frequently in southern England.

Flowering Plants and Ferns (D. R. Grant)

The area supported a flora typical of the Jurassic limestone. Members followed the lane out of the farmyard, passing *Myrrhis odorata*. The damp laneside banks had many False Oxlips and some colonies of *Adoxa moschatellina*. In the hedgerow were *Acer campestre* and *Euonymus europaeus*. Hell Bank Wood was then entered. Here *Prunus avium* and *P. padus* were seen; the ground flora included *Allium ursinum*, *Mercurialis perennis*, *Veronica montana*, *Melica uniflora*, *Campanula latifolia*, and a small clump of *Paris quadrifolia*.

At the foot of the dale there were small colonies of *Petasites hybridus* and *Stellaria nemorum*. The banks of the River Seven had some large stands of *Montia sibirica*.

In the afternoon Cropton Banks Woods and adjacent fields were investigated. Many plants of *Primula veris*, *P. vulgaris* and *Narcissus pseudonarcissus* were seen. In a damp area *Dactylorhiza fuchsii* was growing, with *Populus tremula* nearby. In the woods *Convallaria majalis* was plentiful, with *Galium odoratum* and *Melica nutans*. A small amount of *Cornus sanguinea* was observed.

A rocky outcrop had *Helianthemum nummularium* and *Origanum vulgare*. The most interesting find was the rare grass *Hordelymus europaeus*, which was on a bank near Appleton Mill Farm. Small pockets of acid soil occurred throughout the area, supporting plants such as *Vaccinium myrtillus*, *Luzula sylvatica* and *Stachys officinalis*. Sedges and ferns were poorly represented in the area, the only fern of note being *Polystichum aculeatum*. Some of the party saw *Plantanthera chlorantha* on an adjacent SSSI area.

Mycology (W. G. Bramley and A. Hawkswell)

The cold and wet spring was not conducive to a long list of fungi, and most of the species recorded were common. The Myxomycete *Lycogala epidendrum* was frequent. Ascomycetes included *Calloria fusarioides* on *Urtica dioica*, *Cyathicula cyathoidea* on *Cirsium arvense*, *Dasyscyphus grevillei* on *Heracleum sphondylium*, *D. mollissimus* on *Arctium* and *Heracleum*, *D. nidulus* on *Chamerion angustifolium*, *Daldinea concentrica* on *Fraxinus*, *Phialea cyathoidea* on several plants, *Pisollaea nigrostriata* on *Heracleum*, *Diatrype stigma* and *D. disciformis*, *Leptosphaeria acuta* on *Urtica*, *Ophiobolus acumina-*

tus on *Cirsium vulgare*, *O. erythrosporus* on *C. arvense* and *C. vulgare*, *Xylaria hypoxylon* and *X. longipes*. *Ceratocystis ulmi* had infected several elm trees and some had been felled a few years ago, suffering from Dutch Elm Disease.

Only four Agaricales were seen: *Coprinus disseminatus* and *C. plicatilis*, *Psathyrella candolleana* on rotting logs, and *Tricholoma gambosum* in clearings. Other Basidiomycetes included *Hirneola auricula-judae* on *Sambucus nigra*, *Piptoporus betulinus*, *Stereum hirsutum*, *Dacrymyces stillatus* and *Exidia glandulosa*. Rusts and smuts, all of which were scarce, were represented by *Entyloma ficariae*, *Uromyces dactylidis* and *D. ficariae* on *Ranunculus ficaria*, *Melampsora populnea* on *Mercurialis perennis*, *Puccinia chaerophylli* on *Myrrhis odorata*, *P. sessilis* on *Allium ursinum*, *Tranzschelia anemones* and *Ochrospora ariae* on *Anemone nemorosa*, *Uromyces muscari* on *Hyacinthoides non-scripta*, *Ustilago violacea* on *Silene dioica*, and *Urocystis anemones* on *Anemone nemorosa*. Hyphomycetes included *Botrytis globosa* on *Allium ursinum*, *Dendryphiella virosa* on *Myrrhis odorata*, *Periconia byssoides* on *Myrrhis* and *Heracleum*, *P. ? cookei* on *Heracleum*, *Stachybotrys cylindrospora* on *Heracleum* and *Torula herbarum* on *Heracleum* and *Myrrhis*. The most interesting find was *Hormiactis alba* (**IMI** 295641) on *Periconia ? cookei* on *Heracleum*. This is new to Yorkshire. A second gathering of *H. alba* on *Periconia byssoides* on *Myrrhis* was made at Rosedale Abbey on 29 June.

Bryology (T. L. Blockeel)

Bryological recording was centred on Hell Bank Wood and Cropton Banks Wood, where about 70 species were seen. The richest habitat was on the calcareous grit. *Apometzgeria pubescens* was moderately plentiful and *Porella arboris-vitae* was seen in small quantity, both species being rare in North-east Yorkshire. Other calcicoles included *Radula complanata*, *Fissidens cristatus*, *Eucladium verticillatum*, *Oxystegus sinuosus*, *Trichostomum brachydontium*, *Zygodon viridissimus* var. *stirtonii*, *Neckera crispa*, *Anomodon viticulosus*, *Hygrohypnum luridum* and *Isothecium myurum*. The ground flora of the woods included *Plagiochila asplenioides sensu stricto*, *Dicranum majus*, *Hookeria lucens* and *Rhytidiadelphus triquetrus*, and on rotten logs were *Nowellia curvifolia* and *Dicranum tauricum*. No epiphytes of special note were observed.

ACASTER MALBIS (VC 64), 1 June (Mrs J. Payne)

About forty naturalists gathered at the Memorial Hall on 1985's one perfect summer day! The party walked along the village to the Post Office, and then worked the river side to South Ings, crossing by the public footpath. After lunch Stub Wood was visited by kind permission of Miss C. Woolcombe and Mr R. Raimes.

Twenty-eight people enjoyed a home-made tea in the hall, followed by a meeting for the presentation of reports chaired by the President, Mr R. Crossley. Nineteen societies answered the roll call. Miss J. Robertson proposed a vote of thanks to the landowners, and the President thanked Mr and Mrs K. G. Payne for the tea and arrangements and for Mrs Payne's past work as Divisional Secretary. Mr D. Savage, the new VC 64 Divisional Secretary, was introduced.

Ornithology (A. J. Wallis)

During the day 42 species of bird were recorded. The walk through the village provided 16 species, the river bank and South Ings 20, and Stub Wood 22.

There were no surprises in the village, except for a Goldcrest singing from the small group of conifer trees. A Jay and a Treecreeper were seen and a Tawny Owl heard, in a line of trees backing the tow-path. The open meadowland of the Ings was attractive only to Corn Bunting, Skylark and Curlew. Along the river Mallard and a single Black-headed Gull were the only water birds; with plenty of bushes it was surprising that Reed Bunting was neither seen nor heard. Across the river, in Moreby Park, Willow Warbler, Blackcap and Whitethroat were all heard. Otherwise the list was of species which could be expected, all probably passing through the area.

In Stub Wood the birds were typical of such a habitat surrounded by agricultural fields. The tits were not as numerous as expected in a wood with so many Oaks, Blue, Great and Willow Tits being the only species recorded except for a family party of Long-tailed Tits which moved through a line of Hawthorns at the wood edge. Willow Warbler, Blackcap and Garden Warbler were all present. With the large proportion of Birches, it was no surprise to find Great Spotted Woodpecker, and Cuckoo and Red-legged Partridge were recorded from surrounding farmland.

Entomology (W. A. Ely)
The sunny weather was ideal for insects, and the banks of the River Ouse were alive with them. Species with aquatic larvae were abundant, with caddisflies and alderflies everywhere. The latter were *Sialis nigripes*, the most scarce of the three British species. The ground bug *Kleidocerys resedae* was swept, together with the capsid bug *Orthops basalis* (new to Yorkshire). The carrion beetle *Aclypea opaca* and the dead wood beetle *Corticeus bicolor* were found. Mr Kendall found the cardinal beetle *Pyrrochroa serraticornis*, Mr Bailey collected the click beetle *Cidnopus aeruginosus*, and nearly everyone saw the very uncommon Tansy Beetle, *Chrysolina graminis*. Among the Hymenoptera was the tiny ichneumon *Nematomicrus tenellus* (new to Yorkshire) and the proctotrupid *Cryptoserphus aculeator*.

In the afternoon Stub Wood was visited, where the stand of *Lamium album* at the entrance had the Pied Shield Bug (new to VC 64). In the wood itself was the ground bug *Scolopostethus grandis* (second Yorkshire record and new to VC 64) and the beetles *Dasytes aerosus*, *Rhizophagus perforatus*, the raspberry beetle, *Byturus ochraceus* and the weevil *Rhynchaetes germanicus*. Mr Kendall collected *Heterocerus fenestralis*, the longicorn *Rhagium mordax* and the leaf beetle *Zeugophora subspinosa*. Among the flies was the acalypterate *Lauxania cylindricornis*. Three ichneumons were new to the vice-county: *Ophion ventricosus*, *Phaeogenes maculicornis* and *Pimpla melanacrias*, the latter the third record for Yorkshire. The proctotrupids included *Pantoclis subatricornis*.

Lepidoptera (Mrs J. Payne)
The day was perfect for flying insects, but after the cold, dull spring butterflies and moths were only just emerging. The Ings produced six species of butterfly, and Stub Wood eight. Orange Tips, *Anthocharis cardamines*, were everywhere, and a female was seen ovipositing its orange eggs on *Alliaria petiolata*. At least four Brimstone butterflies, *Gonepteryx rhamni*, were in Stub Wood, and as *Frangula alnus* was present a search was made for eggs, but without success. Six species of moth were recorded. The Small Yellow Underwing, *Panemeria tenebrata*, was flying over flowers in the wood, and the Grey Birch, *Aethalura punctulata*, was seen between the Birches. A Mother Shipton, *Euclidimera mi*, was on the fringe of the woodland. Two species of longhorn moth were flying in the wood, and the larvae of the Green Oak Tortrix hung from the Oaks on silken threads.

Flowering Plants and Ferns (D. R. Grant)
In the village hedgerows were *Humulus lupulus*, *Bryonia dioica* and *Symphoricarpos rivularis*. A large stand of *Reynoutria japonica* was seen by Naburn Lock, with a few plants of *R. sachalinensis* in the midst of the colony. A small wood had *Poa nemoralis* growing at its margin.

The South Ings are damp meadows dominated by *Carex disticha* and *Silaum silaus*. Other plants here were *Polygonum amphibium*, *P. bistorta*, *Sanguisorba officinalis* and a few tufts of *Carex acuta*. On the river bank were *Geranium pratense*, *Cerastium arvense* and *Campanula glomerata*. In a sandy area were *Allium scorodoprasum*, *A. vineale* and *A. oleraceum*. Other plants in the area were *Saponaria officinalis*, *Thalictrum flavum* and *Cardaria draba*. A hedgerow had *Cornus sanguinea*, and in a nearby ditch grew *Alisma plantago-aquatica*, *Veronica anagallis-aquatica* and *Elodea nutallii*.

In the afternoon Stub Wood and the area adjacent to the old airfield runways were examined. In the sandy soil at the edge of the concrete *Erophila verna*, *Cerastium*

glomeratum, *C. semidecandrum*, *Geranium dissectum*, *G. pyrenaicum*, *Vulpia bromoides*, *Sedum acre* and *S. album* were noted. On the fringe of the wood there was a small colony of *Populus tremula*, growing with *Calamagrostis canescens* and *Frangula alnus*. In the drier parts of the wood there were some large stands of *Rhododendron ponticum*. *Carex pilulifera* and *Corydalis claviculata* were found in small clearings. Other plants of note were *Malus sylvestris*, *Calystegia sepium* and *Calamagrostis epigejos*. In the drainage ditch running through the wood was a stand of *Iris pseudacorus*, with a small colony of *Carex curta* nearby. On the damp banks *Primula vulgaris* and *Pimpinella major* were seen.

Mycology (A. Hawkswell)
The St George's Mushroom, *Tricholoma gambosum*, was found on South Ings and at the edge of Stub Wood. Also on the Ings were Thistle Rust, *Puccinia punctiformis*, in fair quantity and *P. recondita* f. *persistens* on *Thalictrum flavum*. The downy mildew *Peronospora parasitica* was on *Capsella bursa-pastoris*. The woodland fungi were disappointing, yielding only a few common brackets and a small crop of *Bolbitius vitellinus*. The day's total was 11 species.

Bryology (Miss J. Robertson and T. Wall)
The morning was spent near Acaster Ings, in scattered deciduous woodland around Naburn Lock. Species present here were *Brachythecium rutabulum*, *Rhizomnium punctatum*, *Eurhynchium praelongum* and *Hypnum cupressiforme*. Masonry was colonized by *Tortula muralis*, *Funaria hygrometrica*, *Rhynchostegium riparioides*, *Homalothecium sericeum*, *Orthotrichum diaphanum* and *Schistidium apocarpum*. *Pohlia carnea* covered some mud banks. Old tree boles examined in the River Ouse flood zone produced *Leskea polycarpa*, *Myrinia pulvinata*, *Tortula latifolia* and *Amblystegium riparium*.

In Stub Wood, the well established deciduous woodland visited in the afternoon, *Fissidens taxifolius*, *F. bryoides* and *Conocephalum conicum* were on the soil of ditch banks. Old concrete runways were covered with *Bryum argentium*, *Grimmia pulvinata*, *Barbula unguiculata*, *Ceratodon purpureus*, *Bryum capillare*, *Rhytidiadelphus squarrosus* and *Calliergon cuspidatum*. Epiphytes on old tree boles and rotting timber included: *Amblystegium serpens*, *Brachythecium velutinum*, *Hypnum cupressiforme* var. *resupinatum*, *Orthodontium lineare*, *Aulacomnium androgynum*, *Tortula subulata* var. *subinermis* and the hepatic *Lophocolea heterophylla*. On the woodland floor were: *Dicranella heteromalla*, *Isothecium myurum*, *Plagiothecium denticulatum*, *P. undulatum*, *Eurhynchium swartzii*, *Mnium hornum*, *Atrichum undulatum* and the hepatic *Lophocolea bidentata*. In one damp hollow Mr Wall found *Sphagnum palustre*, *Dicranella cerviculata* and *Polytrichum formosum*.

CAT BABBLETON (VC 61), 22 June (B. S. Pashby)

Cold, wet weather was forecast for the day of the meeting, but after early morning showers, the 28 people who braved the elements were rewarded with a dry, if overcast, day, much warmer than expected. Members were welcomed at Cat Babbleton Farm by the owner, Mr Peter Dunning, who explained how he had set aside part of his land for nature conservation purposes and invited members to pay further visits if they so wished at different times of the year.

Members re-assembled at the farm at 4.30 pm, when the meeting for the presentation of reports was held in one of the farm buildings. The President, Mr Roy Crossley, took the Chair, 18 members being present, representing 15 societies. Thanks were expressed to Mr Dunning for permission to hold the meeting on his farm, to Mr Wrigley for permission to visit part of the Ganton Estate, and to the Divisional Secretary for making the arrangements for the meeting.

Ornithology (A. J. Wallis)
The total number of species recorded during the day was 29. Eleven species were noted in and around the farm buildings, with Tree Sparrow and Spotted Flycatcher the most

noteworthy. A pair of Swallows were flying about the buildings, but no evidence of nesting was found, as the farm does not have any cattle or horses.

A valley with rough chalk grassland on both sides was explored. Of the ten species recorded here, Common Whitethroat and a Lesser Whitethroat were of interest, and a pair of Grey Partridges was flushed from a brood of five chicks.

An area of mature mixed woodland on a valley side provided the most interesting sighting of the day, a flock of eight Crossbills flushed from a row of mature Pines by the bangs of an automatic bird-scarer. As it appears that there has been an irruption of this species from the Continent in 1985, it seems likely that these were immigrant birds. The woodland was quite heavily infested by Wood Pigeons, and Goldcrests were heard singing and calling. Hanging on the fence to the wood, two dead Carrion Crows were the only evidence of this species seen during the day. The list in this area totalled 14 species.

A steep, sloping, grassy bank, invaded in parts by a dense scrub, mainly of Hawthorn, was attractive to Willow Warblers, with at least six pairs located, and two Garden Warblers were heard singing, as was the only Turtle Dove of the day. A single Magpie was seen. Finches were frequent on the bank, with (in order of abundance) Chaffinch, Linnet, Goldfinch, Greenfinch and Bullfinch recorded. The total for this area was 18 species.

It was hoped that Whinchat might be encountered on the scrub-covered bank, but none could be found. The other noticeable absentee during the day was Corn Bunting.

Mammals and Other Vertebrates (B. S. Pashby)
Three dead Moles and one dead Common Shrew were found, and Rabbit, Hare and Field Vole were recorded. An occupied Badger sett was seen. The dew-pond contained Common Frogs and an unidentified species of Newt.

Mollusca (P. Lee)
Despite the ideal weather conditions and the underlying chalk, Cat Babbleton produced only 21 species of mollusca. *Candidula intersecta*, along with three other species, was confined to the grassy valley, where it was common on the drier slopes. A black form of *Arion ater* agg. was very abundant in the valley bottom. The remaining species were represented by relatively small numbers of individuals from the woodland and the farmyard.

Entomology (W. A. Ely)
The wet conditions made entomology rather difficult, and insects were not easy to find. The stiff breeze eventually dried the vegetation, permitting the use of the sweep nets in the afternoon.

Mr Denton investigated the dew-pond and found seven species of water beetle, but most of the time was spent in the valley to the west of the farm. Among the bugs were the tiny *Loricula pselaphiformis* and the capsid *Orthops basalis*, the second Yorkshire record, new to the vice-county. The carrion beetle *Sciodrepoides watsoni*, the rove beetle *Tachinus corticinus*, the pollen beetle *Meligethes nigrescens* and the flower beetle *Anaspis humeralis* were found. Mr Crossley collected the seed-weevil *Bruchidius cisti* from Broom, and Mr Denton found *Isomira murina* commonly on Hawthorn. The most interesting beetles were the iridescent green leaf beetles, *Crytpocephalus aureolus*, on Rockrose. Near the entrance to the valley I found the yellow cranefly *Limonia nigropunctata*, the fourth Yorkshire record, new to VC 61. Among the acalypterate flies collected was *Chamaemyia nigripalpis*, a tiny silver-grey insect whose larvae feed on coccids. The ichneumons included *Heterischnus nigricollis* (new to Yorkshire), *Acrotomus lucidulus* (third Yorkshire record, new to VC 61), *Scambus pomorum* (fourth Yorkshire record, new to VC 61), *Exyston sponsorius* and *Alomya debellator* (both new to VC 61).

Arachnology (C. J. Smith)
The wet vegetation hampered work, but we were able to record 28 species, most of them common. The Gorse, however, yielded two more unusual species, *Anyphaena accentuata*

and *Dictyna latens*. This is the eighth Yorkshire record since 1950 of the former (also recorded this year on the Union's excursion to Appleton le Moors), and the fifth Yorkshire record since 1950 of the latter. Both species seem to have been more widespread and common in Falconer's days just after the turn of the century.

Flowering Plants and Ferns (D. R. Grant)

Members left the farm by a green lane descending to the dry chalk valley situated to the north-west of the farm buildings. The cornfield adjacent to the lane contained some common agricultural weeds, together with *Papaver lecoqii*. On the steep sides of the valley *Filipendula vulgaris*, *Primula veris*, *Helianthemum nummularium* and *Bromus erectus* were common. Some drier parts had *Cerastium arvense*, *C. glomeratum*, *Aphanes arvensis* and *Aira caryophyllea*. Other interesting grasses here were *Avenula pratensis*, *Koeleria macrantha* and *Desmazeria rigida*.

Many plants of *Orchis mascula* were seen in several places, some still in perfect flowering condition reflecting the very late spring. Other orchids noted were *Coeloglossum viride* and *Listera ovata*. At the edge of the woodland were *Viloa hirta* and *Moehringia trinervia*. In one place where scrub clearance was taking place, regenerating plants included much *Carduus nutans* and a single *Onopordum acanthium*, whilst in the grassland at the valley bottom *Carex spicata* was seen. Agricultural weed species in the fields of peas and barley to the south of the farm were quite varied, the most interesting being *Legousia hybrida*, *Chaenorhinum minus* and *Lamium moluccellifolium*.

In the final part of the day, members examined the dew-pond and track just north of the farm. *Potamogeton natans*, *Elodea canadensis*, *Ranunculus trichophyllus* and *Eleocharis palustris* grew in the pond, and a small colony of *Galium mollugo* was found beside the track.

Plant Galls (J. Pearson)

Fifteen plant galls were recorded, quite a good list for this type of site. The most interesting was that of the dipteron gall-midge *Dasyneura acrophila* on Ash. The round gall, *Jaapiella veronicae*, on Germander Speedwell, is also caused by a dipteron gall-midge. There was only one Oak of any size, and on this were found four galls, two of which, the Artichoke Gall, *Andricus fecundator*, and the Marble Gall, *A. kollari*, were galls from last year.

A complete list has been deposited with the recorder, Mr F. B. Stubbs.

Bryology (Miss J. Robertson)

The dry chalk south of the farm had a well developed moss flora. Common species around buildings included: *Bryum argenteum*, *B. capillare*, *Ceratodon purpureus*, *Funaria hygrometrica*, *Tortula muralis* and *T. ruralis*. On bare soil along arable field margins were: *Fissidens taxifolius*, *Barbula fallax*, *B. tophacea*, *B. unguiculata*, *Dicranella varia*, *Phascum cuspidatum*, *Eurhynchium swartzii* and *Pohlia nutans*. *Hypnum cupressiforme*, *Calliergon cuspidatum* and *Homalothecium lutescens* colonized an old chalk pit.

Open, steep, grassy hillsides produced: *Ctenidium molluscum*, *Hylocomium splendens*, *Rhytidiadelphus squarrosus*, *Pseudoscleropodium purum*, *Brachythecium rutabulum* and *Cirriphyllum crassinervium*. Where open scrub predominated, *Rhytidiadelphus triquetrus*, *Mnium hornum*, *Plagiomnium undulatum*, *Eurhynchium praelongum*, *Dicranum scoparium*, *Atrichum undulatum* and occasional *Lophocolea bidentata* carpeted the ground.

Epiphytes on living trees and decayed stumps included *Hypnum cupressiforme* var. *resupinatum*, *H. mammillatum*, *Amblystegium serpens*, *Aulacomnium androgynum*, *Plagiothecium denticulatum*, *Brachythecium velutinum*, *Orthodontium lineare*, *Dicranoweisia cirrata* and the hepatic *Lophocolea heterophylla*. One or two sheltered old Elders in mature deciduous woodland and in old hedgerows provided sites for fruiting *Orthotrichum affine*, *O. diaphanum*, *O. pulchellum* and the hepatic *Metzgeria furcata*.

Lichenology (D. H. Smith)

The only extensive areas of saxicolous lichens were on the walls of the farm outbuildings, and consisted largely of *Physcia adscendens* and *Xanthoria parietina*, intermingled with *Caloplaca decipiens* and *C. flavescens* and the ubiquitous *Lecanora dispersa*, though a few concrete posts down the valley path held a horizontal layer of *Phaeophyscia orbicularis* with *X. parietina* down the sides. Terricolous lichens such as *Peltigera* stood little chance of gaining a foothold due to the blanket cover of lush vegetation, but a small patch of *Cladonia furcata* had established itself on the north flanks of the main valley.

The mature Ash trees down the valley held the majority of lichens found. Most were dominated by thalli of *Evernia prunasti* for the full length of the main trunks, but on some *Ramalina farinacea* dominated, both species particularly robust, with little evidence of distortion by pollution. Two or three trees bore extensive streaks of the orange-tinged *Chaenotheca ferruginea* with unusually multi-furcate fruits, some stalks bearing up to ten ascocarps. *Cladonia coniocraea* covered the bases of a number of trees. There were lesser quantities, in order of abundance, of *Pertusaria amara*, *P. pertusa*, *Parmelia glabratula*, *P. sulcata*, *Phlyctis argena* (extensively sorediate, with little of the usual bare patches), *Hypogymnia physodes* (unusually sparse), *Pseudevernia furfuracea* (the chemical C+r race, var. *ceratea*), *Buellia punctata* and *Lepraria incana*. Odd scattered thalli of the yellow *Xanthoria candelaria* and juvenile *Physcia tenella* were also noted. One tree bore the unmistakable bright yellow powdering of *Chrysothrix candelaris* in the bark crevices. Other species of tree bore little lichen covering except for a small amount of *Lecanora conizaeoides*. As a biological litmus, the lichen cover indicates a relatively moderate level of atmospheric pollution in this site.

THRYBERGH (VC 63), 6 and 7 July (T. Higginbottom)

Twenty members attended on each day of the meeting, representing 11 societies, with the local societies from Rotherham and Doncaster giving strong support. On a bright but breezy Saturday morning the Senior Ranger of Thrybergh Country Park, Mr M. Woods, welcomed members to the area and gave an informative talk about the park. A sketch map of the area was provided showing the ten sites for study with their access points marked.

The urban fringe around Thrybergh offered a number of contrasting sites: secondary woodland on Magnesian Limestone, Coal Measures woodland near Silver Wood Colliery, regenerating vegetation beside disused reservoirs, the parkland and fishing ponds at Ravenfield Park, a large area of open water on the edge of Thrybergh Tip, and the rarely visited site between the River Don and the Thrybergh Bar Mill, owned by the British Steel Corporation.

Sunday was sunny and warm. Members were led in convoy into the BSC site, where they were welcomed by the BSC security staff and escorted to a parking space. The party walked along the tow-path beside the River Don, which led to an open area in front of the bar mill.

At 5.00 pm on Saturday, a brief meeting was held in the fishermen's hut beside the reservoir of the Country Park, for the benefit of members who were unable to attend on both days. The Chairman, Mr W. A. Ely, took the chair for this meeting. On Sunday the President, Mr R. Crossley, took the chair for a full meeting at which members presented reports. The President proposed a vote of thanks to the Divisional Secretary for organizing the meeting and providing cups of tea. The Divisional Secretary proposed a vote of thanks to the many landowners and national corporations who had given permission for members to visit the various sites. He also thanked Mr M. Woods, the Senior Ranger of Thrybergh Country Park, for his help in arranging the visit and for the advice given by the wardens of the Country Park. After thanking the members for their interesting and informative reports, the Divisional Secretary went on to praise the local societies, the Doncaster Naturalists' Society and the Rotherham Naturalists' Society, for the way their members had supported the meeting, and for the valuable individual

contributions made by members from these societies, some of whom had presented reports to a YNU field meeting for the first time.

Ornithology (S. Holliday)

Records were received for a variety of habitats and a creditable total of 60 species was recorded.

There were several suitable habitats for water birds, but it was disappointing to see so few broods of waterfowl. Disturbance, including egg theft, is known to be a local problem, but nevertheless Little Grebes were found with three young at Firsby Reservoir, whilst at Thrybergh Tip several pairs of Little Grebes and also Great Crested Grebes were awaiting repeat clutches of young. Of interest also at the Tip were three sub-adult Grey Herons, which appeared to be summering in this part of the Don Valley, together with a male Ruddy Duck, a species which is just establishing itself in the area.

The banks of the River Don produced sightings of Little Ringed Plover and Kingfisher, but no trace of a former Sand Martin colony.

The scrubby edges of both wetland and woodland sites held a varied selection of passerines including Whitethroat and Lesser Whitethroat, sightings of the latter surprisingly being more frequent. This warbler appears to have enjoyed a particularly good season. Woodland birds, however, proved difficult to find, and some species were undoubtedly overlooked. Willow Tits were seen in the limestone woodland of Hooton Cliff Wood, but the Marsh Tit, which has its stronghold in the woodlands of a neighbouring limestone belt a few miles to the east, was absent.

Mollusca (P. Lee)

The weather conditions were not ideal for mollusca, but despite the sunshine various sites produced a total of 33 different species.

The two most profitable sites were Hooton Cliff Wood and the waste ground beside the River Don by the BSC's Thrybergh Bar Mill. The most interesting find in Hooton Cliff Wood was *Balea perversa*, a widespread but declining species, characteristic in Yorkshire of dry, rocky places, only occasionally found in ground litter as it was at this site. Among other species found in the wood was *Oxychilus helveticus*, which shows a black body band through the shell close to the mouth.

The interesting finds by the Don were typical of disturbed and waste areas where species have been accidentally introduced by man. *Oxychilus draparnaudi* was found here, as was the slug *Deroceras caruanae*.

Entomology (W. A. Ely)

It was pleasant to have a hot, dry weekend for this meeting, and the insects were correspondingly rewarding. I had a quick sweep around the marshy margin of Thrybergh Reservoir's north bank and found the marsh fly *Colobaea punctata*, whose larvae feed on snails. Mr E. Smith and Mr M. L. Denton spent a full day at this site and collected a large haul of beetles. The Reservoir banks were disappointing, but the grassland on the north-east produced many unusual species, including the ground beetles *Acupalpus dubius* and *Bembidion clarki*, the dung beetles *Cercyon marinus*, *C. convexiusculus* and *C. ustulatus*, the rove beetles *Carpelimus corticinus*, *Stenus canaliculatus*, *Philonthus micantoides*, *Gabrius pennatus* and *G. nigritulus*, *Myllaena brevicornis*, *Atheta aquatica*, *A. celata*, *A. nigra*, *A. coriaria*, *A. hygrobia*, *A. hypnorum* and *A. trinotata* and *Oxypoda amoena* and *O. elongatula*. The scarce soldier beetle *Cantharis paludosa* was found; the weevils included *Notaris bimaculatus*, *Mecinus pyraster*, *Amalus scortillum*, *Apion ervi* and *A. loti* and *Rhinocus perpendicularis*, and other interesting beetles included *Atomaria apicalis*, *Ephistemus globulus* and *Corticaria impressa*.

A group of entomologists visited Ravenfield Park, where Dr R. Key found the beetles *Cyphon variabilis*, *Bruchidius ater* and *Galerucella lineola*. The grassland had the Green Tiger Beetle running and flying, the fly *Chamaemyia aridella*, whose larvae predate

coccids, and the gall wasp *Synergus apicalis*, whose larvae are inquilines in the gall of *Andricus quercus-radicis*. The margins of the pond produced the rare weevil *Ceuthorhynchus angulosus*, and the dry bed of Burcliff Pond had the ground bug *Cymus claviculus*, the shore bug *Saldula pallipes*, the rove beetle *Stenus biguttatus* in abundance, and the nitidulid beetle *Kateretes rufilabris*.

A brief visit to Thrybergh Park produced the flower beetle *Anaspis thoracica* and the fly *Psila persimilis*.

On Sunday morning we investigated the banks of the River Don, and interesting insects here included the click beetle *Athous hirtus* (unusual away from the limestone), the pollen beetles *Meligethes obscurus* and *Brachypterolus pulicarius* (the latter on Toadflax), the ladybird *Adonia variegata* (a scarce insect usually restricted to coastal dunes), the flower beetle *Mordellistena pumila* (scarce in Northern England), the weevils *Apion hookeri* and *Tychius piccirostris*, the small black cranefly *Limonia morio*, the fruit flies *Terrellia serratulae* (with clear wings) and *Urophora quadrifasciata* (with four black bands on each wing) and *Chamaemyia paludosa*. This fly is a Grade 2 national rarity which had only been recorded from the fens of Cambridgeshire, and this river bank was clearly the wrong habitat! The ichneumons included two uncommon species parasitic on hoverflies, *Diplazon annulatus* and *Sussaba pulchella*. Mr P. Kendall travelled further along the river and found the ground beetle *Stenolophus mixtus* and the weevils *Rhynchites interpunctatus* and *Hypera nigrirostris*.

The entomological contingent then investigated Whinney Hill marsh, next to the BSC land, where several of the riverbank species were found again, including the *Chamaemyia*. This marsh was a far more suitable habitat for this insect, and the previous specimen had probably come from here. Mr R. Crossley found the Pied Shield Bug on *Lamium album* near the river, and I found the ground bug *Cymus glandicolor* in the marsh. Mr Kendall collected the ground beetle *Bembidion clarki* and the rove beetle *Stenus nanas*, while I found the pollen beetle *Meligethes difficilis*, the marsh fly *Limnia paludicola* and the ichneumon *Collyria trichophthalma*, a parasite of stem-breeding sawflies. As we were leaving the marsh, I noticed a fresh Red-belted Clearwing moth hovering around one of the cut Birch stumps.

Our final visit was to the marsh at Lodge Farm, near Kilnhurst. Mr Kendall found the ground beetle *Dyschirius luedersi* and *Philonthus quisquiliarius*. I collected the dung beetle *Cercyon marinus*, the rove beetles *Carpelimus bilineatus*, *Lathrobium elongatum* and *L. quadratum*, *Atheta hygrabia* and *Tachyusa atra*, the soldier beetle *Cantharis thoracica*, the pollen beetle *Meligethes erythropus*, the caterpillar of the Grey Chi moth, *Antitype chi*, and the ichneumon *Tryphon trochanteratus*.

The entomologists present made a significant contribution to our knowledge of this area's wildlife, and found many insects which were new to the area or were significant for the county.

Other Arthropods (P. Lee)

The most interesting find was the small white woodlouse *Haplophthalmus mengei* from Hooton Cliff Wood. This soil-living species is badly under-recorded.

Flowering Plants and Ferns (D. R. Grant)

Members first examined the shore-line of Thrybergh Reservoir. There was only a limited flora here due to the steep, stone-built sides of the reservoir, although there were many plants of *Carex hirta* in the damper areas. The most interesting species found here was *Polygonum amphibium*.

Firsby Reservoir was the next site visited. Here a lower water table gave a much more varied flora. There were large stands of *Carex acutiformis* and *Equisetum fluviatile*. *Silaum silaus* and *Ophioglossum vulgatum* were growing in the damp grassland, while on the dry banks *Galium verum* and *Carex spicata* were found in small quantities. In the open water was *Myriophyllum spicatum*, and along the hedgerow of the lanes leading up to the

reservoir were *Cornus sanguinea*, *Acer campestre*, *Lycium chinense* and *Dipsacus fullonum*.

In a small area by the River Don at Kilnhurst Bridge another colony of *Carex spicata* was found, together with *Saponaria officinalis* and *Glyceria plicata*.

Puccinellia distans was found on the roadside verge of the B6090 road to Kilnhurst. A rough bank with much Gorse and Broom was examined. In the more open areas there was a small quantity of *Pastinaca sativa*. *Apera spica-venti* was growing in a thick band at the edge of the adjacent cornfield.

Aira praecox and *Hypericum humifusum* were found on a dry bank in the Thrybergh Tip area. Large stands of *Potamogeton crispus* and *Myriophyllum spicatum* were growing in the open water. The best find here was the grass *Vulpia myuros*. In the area adjoining Rotherham Golf Course *Humulus lupulus*, *Euonymus europaeus* and *Ranunculus hederaceus* were discovered.

Sunday morning was spent on the banks of the River Don in the BSC site at Thrybergh Bar Mill. Although much of the ground had been disturbed, there were plenty of common species. *Senecio squalidus* and *Reynoutria japonica* were here, but not in great quantity. The most interesting plants found here were *Stachys palustris*, *Desmazeria rigida*, *Senecio erucifolius* and *Centaurium erythraea*. Near the entrance to the Steel Works there was a large colony of *Foeniculum vulgare*.

Just to the east of Hooton Roberts village there is an outlier of Magnesian Limestone, isolated from the larger bands of this rock at Conisbrough, a few miles away. Plants found in this area were *Clematis vitalba*, *Rhamnus catharticus*, *Euonymus europaeus*, *Eupatorium cannabinum* and *Crataegus laevigata*.

The fishing ponds in the Ravenfield valley were in the process of being refurbished and deepened, but still present here were *Nuphar lutea*, *Potamogeton natans*, *Elodea canadensis* and *Bidens tripartita*. On the marshy ground were large quantities of *Isolepis setacea* and *Ranunculus sceleratus*. *Symphytum officinale* and *Lactuca serriola* were growing on waste ground near the car park.

Plant Galls (J. A. Pearson)

A large area was covered during the two days of the meeting, but surprisingly only about 20 different galls were recorded.

The two most interesting discoveries were the mite gall *Eriophyes iteina* on a *Salix* leaf and the 'truffle gall' found on the root of *Quercus*. The 'truffle gall', caused by the gall wasp *Andricus quercus-radicus*, was discovered by the mycologists in their searches for fungi in the leaf litter. Both galls were new records for the 10 km square SK 49.

Another interesting record was the lepidopteran gall *Mompha nodicolella*, which was discovered on the stem of *Chamaenerion angustifolium*. A stem gall was also found on *Artemisia vulgaris*, caused by the gall midge *Paroxyna misella*. A plant of *Hypochoeris radicata* served as host for the gall wasp *Phanacis hypochaeridis*.

Mycology (R. Taylor)

On 6 July Firsby Reservoir, Ravenfield Park and Hooton Cliff Wood were visited. The following day investigations continued in the area by the River Don near BSC's Thrybergh Bar Mill, and also at Silverwood and the adjoining Gulling Wood.

Two Myxomycetes were found: *Arcyria nutans*, which was discovered on *Quercus* debris in Silverwood, and *Fuligo septica*, which was abundant throughout both Silverwood and Gulling Wood.

The Ascomycetes collected from the BSC site were *Dasyscyphus niveus*, *D. acutipilus*, *Xylaria polymorpha* and *Lasiosphaeria spermoides*, this latter also being found in Hooton Cliff Wood.

The moist conditions in the days before the meeting produced various Basidiomycete fruitings. Interesting finds included *Russula atropurpurea*, found in Silverwood, and *Leccinum scabrum*, discovered in the Firsby Reservoir site. The unmistakable odour of *Phallus impudicus* led us to a site in Gulling Wood, where, beneath *Fagus sylvatica*, several mature specimens were found, together with many large 'eggs'.

Bryology (C. Wall)

Three sites were visited on 7 July, the first being waste land in the British Steel Corporation works at Thrybergh. Here it was surprising to see *Drepanocladus aduncus*, a species normally associated with an aquatic habitat, growing alongside *Homalothecium lutescens* high on a disused slag bank. Nearer the steelworks many common bryophytes were flourishing in the humid atmosphere around a leaky steam valve, including *Bryum bicolor* and the thalloid hepatic *Marchantia polymorpha*.

Species noted at the second site, a steep-sided drain at Ravenfield Park, included *Amblystegium tenax*, *Rhynchostegium riparioides* and the hepatics *Conocephalum conicum* and *Pellia endiviifolia*.

Finally, the Magnesian Limestone ridge in Hooton Cliff Wood yielded the typically calcicole species *Tortula subulata*, *Neckera complanata*, *Thamnobryum alopecurum*, *Homalothecium sericeum*, *Taxiphyllum wissgrillii* and the hepatic *Plagiochila porelloides*.

I am grateful to Mr T. Blockeel for providing confirmation of the more difficult species, and also for his comments on *Amblystegium tenax* and *Homalothecium lutescens*, both of which are scarce in South Yorkshire.

BOOK REVIEWS

Snakes of the World by **Chris Mattison**. Pp. 190, with 12 maps and 100 plates (mainly in colour). Blandford Press, 1986. £10.95.

This book is an introduction to the snakes of the world written by an author who has spent many years studying and lecturing on them. It is not an identification guide, although 55 pages are devoted to a review of the families of snakes, which is rather more extensive than one would expect for an introductory text, but an introduction to the natural history of snakes, dealing with their characteristics, colour, reproduction, feeding habits, defence mechanisms, behaviour and ecology. Clearly in so few pages no topic can be presented in depth but some interesting observations are made, such as the inability to feed in the later stages of pregnancy which becomes a problem for temperate species where there is a need to build up a food reserve before low winter temperatures force them into hibernation. Such females have barren years to replenish food reserves, thereby striking a balance between their own well-being and the need to produce offspring. The colour plates seem to be very good and make this book excellent value for money and a good introduction to the suborder Serpentes.

MEA

Sharks of the World by **Rodney Steel**. Pp. 192, illustrated with line drawings, b/w and colour photographs. Blandford, 1985. £10.95.

Familiar to everyone, yet widely misunderstood and misrepresented, sharks have long been regarded as mindless killers, whose physiological simplicity has enabled them to survive with little change for over 350 million years.

Exciting new researches, made possible by modern free-diving equipment, accompanied by developments in underwater photography, have provided numerous revelations. Rodney Steel eloquently marshals these latest discoveries, demonstrating that sharks are anything but primitive, have surprisingly large brains, sensory perception of totally unexpected sensitivity and complex behaviour patterns.

Methods by which the world's numerous species of sharks exploit environments as diverse as inland lakes, coral reefs and ocean deeps are revealed, and feeding techniques ranging from sieving plankton and unearthing molluscs to attacking prey as large as sea lions are investigated.

The 11 chapters deal in a clear and lively manner with such aspects of palaeontological history, evolution, anatomy, feeding and breeding adaptations. They present much new scientific data, enriched with fascinating anecdotes and allusions from ethnography, myth and folklore culled from a wide literature. The chapter entitled 'The Human Toll' is journalistic rather than analytical, pandering to the bizarre media-created fascination with shark–human interactions, but it will doubtless sell copies.

This is not a systematically laid-out textbook. The chapter headings, designed to excite, lead to a rather jumbled presentation, but the wealth of fascinating data old and new makes compelling and informative reading. Anyone, from the shark enthusiast to the general naturalist, cannot fail to learn much.

The book includes a checklist of sharks living and extinct, a glossary, an excellent guide to further reading and a full bibliography.

CAH

Natural Selection in the Wild by **John A. Endler**. Monographs in Population Biology no. 21. Pp. 336, including diagrams. Princeton University Press, 1986. £28.80 hardback, £10.20 paperback.

Natural selection in the wild is subjected to a most thorough and masterly scrutiny in Endler's book. The eight chapters range through an introduction; philosophical comments; methods for detection of natural selection in the wild; problems in such detection; direct demonstration of natural selection in the wild; estimation and distribution of selection coefficients and differentials; and assessment of the importance of natural selection in evolution. The amount of exemplification is indicated by the necessity for a species index (incorporating an English name glossary) as well as a subject index. The extent of the literature quoted is evident from the 766 references provided. This book is destined to become a landmark in the study of evolutionary mechanisms.

DJH

British Pyralid Moths: A Guide to their Identification by **Barry Goater**. Pp. 175, 9 colour plates, including frontispiece. Harley Books, Colchester, Essex, 1986. £18.95.

As is stated at the beginning of the Introduction, 'The object of this book is to help naturalists and conservationists to identify the species of British Pyralidae.' With this book Mr Goater has supplied a long felt need since its predecessor, Dr B. P. Beirne's *British Pyralid and Plume Moths*, first published in 1952, has long been out of print and is extremely difficult to obtain.

It is not, however, an updated version of that work for it omits the Pterophoridae and Alucitidae (the plume moths) and the treatment and information given for the Pyralid species is quite different. Although both books contain colour plates, Beirne supplied keys to families, genera and species and dispensed with descriptions of the moths in the text to concentrate on descriptions of larvae and feeding habits. The present work relies to a greater extent on the plates for an initial diagnosis but this is supported in the text by comprehensive descriptions of the moths with emphasis on distinguishing characteristics to enable separation of similar species. Additionally, text figures by Mr R. Dyke illustrate differences in wing pattern, venation or genitalia for some species and these are well executed and of excellent clarity.

Additional information is given on times of emergence, larval habits (but there are no descriptions of larvae) and distribution within the British Isles and Channel Islands. The latter information is necessarily brief but it is disappointing that for some species it is quite inaccurate so far as Yorkshire and the north of England are concerned. For instance *Homoeosoma sinuella* (Fabr.) is still given as occurring from Norfolk southwards (as it was by Beirne), whereas there are published records from Derbyshire and Yorkshire where it is a fairly common resident moth in the Doncaster and Rotherham areas. Likewise, the distribution given for *Myelois cribrella* (Hubn.) also echoes Beirne (Lincolnshire and Herefordshire southwards) despite the fact that it was first recorded in Yorkshire in 1948 and is now a common moth at least as far north as York (*Ent. Gazette* (1983) **34**:2).

However it is to the plates that most users of this book will turn first and 272 examples of 208 species are depicted on eight plates, reproduced from photographs taken by Mr G. B. Senior. These can only be described as superb and the bluish background chosen enables details of pale cilia and pale winged species to be clearly seen. Additionally, the frontispiece consists of reproductions of colour photographs by M. W. F. Tweedie illustrating the characteristic resting positions of 12 species in ten sub-families of the Pyralidae.

The book as a whole is attractively produced with a clear typeface and is remarkably free of errors of any kind; however, the specimen of *Acentria ephemerella* (D. & S.) illustrated on plate 3 and purporting to be a male appears to be a female.

This book is more than an identification guide and is wholeheartedly recommended to all with the slightest interest in Pyralid moths as well as to the more knowledgeable lepidopterist. It will undoubtedly give added impetus to the study of these attractive insects.

HEB

The Best of 'BB'. An anthology illustrated by **D. J. Watkins-Pitchford**. Pp. x + 278. Michael Joseph, 1985. £12.95.

There can be very few people with an interest in wildlife and country pursuits who have not read and enjoyed at least some of BB's beautifully written books and articles, which have appeared regularly since 1938. As a child, one of my very favourite books was his *The Little Grey Men*, a thoroughly credible and down-to-earth fantasy, even if that seems a contradiction in terms, and as I grew older, I came to love his more factual works on the countryside. The sportsman-naturalist is perhaps a dying breed, but even those to whom hunting, shooting and fishing are anathema must gain pleasure from his acutely observed portrayals of wildlife and landscape, all the more so as many of those things he wrote of over the last fifty years have sadly disappeared for ever.

This anthology contains extracts from 30 of his books, divided into five sections: 'A child alone', 'A fishing man', 'A shooting man', 'A wandering man' and 'A happy countryman', illustrated, as are all his books, by his own scraperboard illustrations. Thoroughly recommended, especially as bedside or holiday reading.

VAH

Mountain Navigation Techniques by **Kevin Walker**. Pp. 160, with numerous black and white photographs and diagrams. Constable, 1986. £5.95.

This book is no better and no worse than others of its kind. The author is sufficiently honest to stress on the first page that 'there is no substitute for practical experience' and those already capable of moving confidently among the hills will be amazed that a book of this length is necessary to master a few relatively simple techniques. Basically, the book deals first with map reading, interpretation and route finding before moving on to compass techniques, time and distance estimates, and poor-visibility navigation.

Orienteering and the Silva protractor-compass have raised the standard of navigation in this country out of all recognition; it is only those who are unfamiliar with these who will learn much from this book. Aiming off, attack points, handrails and relocation procedures are all worth knowing about. Most naturalists will be familiar with grid references — along the corridor and up the stairs — but it is useful to be reminded that a grid reference is a square, not a point. It is less enlightening to learn that accurate map interpretation depends on CROOK (Concentration, Reasoning, Observation, Organization, Knowledge). This is an example of the padding amongst which the beginner will find nuggets of useful advice.

OLG

In the Rainforest by **Catherine Caufield**. Pp. 304. Picador. 1986. £3.95.

Rainforests cover less than 2 per cent of the earth's surface yet they provide a habitat for nearly half of the world's flora and fauna. *In the Rainforest* however is neither a review of jungle wildlife nor an account of the author's encounters with plants and animals in the rainforests of the world. Wildlife is mentioned of course, but the book is essentially about man's impact on the forest.

Catherine Caufield is an American journalist who has visited tropical rainforests from Queensland to South America and was appalled by the misguided exploitation she found. The problems range from simple mismanagement to greed for fast profits.

In the Rainforest is a clear, jargon-free account of what we are doing to the most vulnerable and diverse habitat on earth. The book should be read not only by naturalists but also by politicians and industrialists in the hope that this wanton destruction might yet be stopped at the eleventh hour.

JKS

A Guide to the Pembrokeshire Coast Path. A Constable Guide by **Christopher John Wright**. Pp. 391, including 66 sketch maps and 15 town plans, plus 24 plates. Constable. 1986. £7.95.

Wales is bounded by sea to the north, west and south and this long coastline provides a superb range of scenery and ecological habitats. The formal promenades of the north Wales coastal resorts contrast with the wild beauty of the Lleyn peninsula or the oil flares, steel mills and shipping ports of south Wales. The coastline of Pembrokeshire encapsulates the whole Welsh experience for it includes precipitous cliffs, a major oil port in Milford Haven and the charm of Tenby town. This coast was designated as Britain's fifth and smallest national park in 1952 and after years of negotiations for new rights of way, together with the construction of nearly 500 stiles and over 100 footbridges, in May 1970 it was opened as Britain's third long-distance footpath.

Christopher Wright has provided a most welcome guide to those wishing to walk this path. The book begins with a general survey with useful advice for all users, followed by descriptions of the scenery, geology, flora and fauna of the coast. After several more pages devoted to the all-important topic of safety, the reader is presented with detailed descriptions of the coastal path, taken section by section. Detailed maps show the route and are annotated with both scenic, geologic and ecological comments and, equally important for the down-to-earth types, locations of toilets, cafés, car parks and camp sites. The written descriptions are equally catholic, ranging from a most useful guide for St David's cathedral to, e.g., a note that the fossil *Didymograptus bifidus* was first discovered in the Ordovician sediments in Trwyncastell near Abereiddy village.

The maps are clearly drawn, as are the town plans, and the volume is nicely illustrated by the author's own photographs. My major area of criticism does, however, concern those maps. One has to hunt to find (p. 14) that the scale is 1:20000: they would have been much improved by incorporating a conventional scale line and north point. A general colour topographic map at, say, 1:250000 would have been a useful addition. Nevertheless, despite these criticisms, the book should prove indispensable for both the casual and serious walker of the Pembrokeshire Coast Path and, weighing just 1 lb and measuring only $7 \times 5 \times 1$ inch, it really is a pocket book.

BED

The New Concise British Flora by **W. Keble Martin**, with revised text by **Douglas H. Kent**, and foreword by H.R.H. The Duke of Edinburgh. Pp. 247, including 94 pages of coloured illustrations and 6 pages of line drawings. Mermaid Books/Michael Joseph and Ebury Press, 1986. £7.95 paperback.

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TWO NEW SPECIES OF SCUTTLE FLY (DIPTERA, PHORIDAE) FROM MALHAM TARN, NORTH YORKSHIRE

R. H. L. DISNEY
Field Studies Council Research Fellow, University Department of Zoology, Cambridge, CB2 3EJ

Megaselia giraudii (Egger) is a widely distributed species of scuttle fly whose larvae are polyphagous saprophages (Robinson 1971, Disney 1979). However it is a somewhat variable species and there has long been confusion regarding the precise distinction between it and a number of related species. The publication of a key to 'der Abteilung VI' of the palaearctic *Megaselia* species (Schmitz and Delage, 1981) has allowed solution of a number of problems. *M. densior* Schmitz was added to the British List (Disney 1985a) and *M. kurahashii* Disney (1985b) added to the palaearctic list. It should be noted, in passing, that *M. chapmani* Borgmeier (1967) was omitted from the key. Furthermore specimens from England attributed to *M. septentrionalis* (Schmitz) were shown to be *M. badia* Schmitz (Disney 1985a).

Despite these clarifications, specimens of the *M. giraudii* complex were continuing to prove difficult to assign to a particular species with confidence. In view of this a range of type material has been assembled and re-mounted on slides. Examination of this material has led to recognition of two new synonyms, the rescue of one species from synonymy, and discovery of two new species from Yorkshire. The justification for these conclusions is given below.

Megaselia breviseta (Wood 1912) (Fig. 1B)

Wood (1912) based his description on a single male collected 'at Mainswood, 29/6/11'. This is mounted alongside two other specimens in his collection. The data label reads 'Mains Wd. 29.6.11. Stoke Wd. 29.5.12, 3.6.12'. A subsequent BM(NH) label reads 'cotypes'. I have remounted all three specimens on slides. Two of these agree with Wood's description in having relatively large antennae, and I have labelled one of these as the lectotype. The third specimen has relatively small antennae and proves to be *M. correlata* (see below).

Megaselia correlata (Schmitz, 1918) (Fig. 1C)

giraudii auctt., nec (Egger, 1862). Misidentification.

Borgmeier (1965) synonymized this species with *M. giraudii* on the grounds that 'Mr Beyer informed me that *correlata* . . . described from Europe is a new synonym of *giraudii*'. I have remounted the holotype of *M. correlata*. Not only will it not run to *M. giraudii* in Schmitz and Delage's key, but it lacks the notopleural cleft characteristic of *M. giraudii* (see below). In the key it runs to couplet 47 (page 676). It differs from *M. breviseta* and *M. rubida* (Schmitz) by its smaller antennae. In *M. correlata* the diameter of the third segment is less than 0.12 mm. In *M. breviseta* it is more than 0.14 mm, and larger still in *M. rubida*. In addition in *M. breviseta* the hair at the base of vein 3 is vestigial or absent. In *M. correlata* it is well developed, being as strong as the costal cilia at the level of the humeral cross vein. The terminal hairs of the anal tube in the male are curiously flattened and twisted in the middle third in *M. breviseta* (Fig. 1B) but are normal in *M. correlata* (Fig. 1C).

Apart from Wood's specimen (misidentified as *M. breviseta*) from Stoke Wood, Herefordshire, I have a male collected from Hayley Wood, Cambridgeshire (Grid ref. 52/2953) by D. M. Unwin 30 June/15 July 1980 (in malaise trap). There are undoubtedly other specimens in collections wrongly labelled as *M. giraudii*.

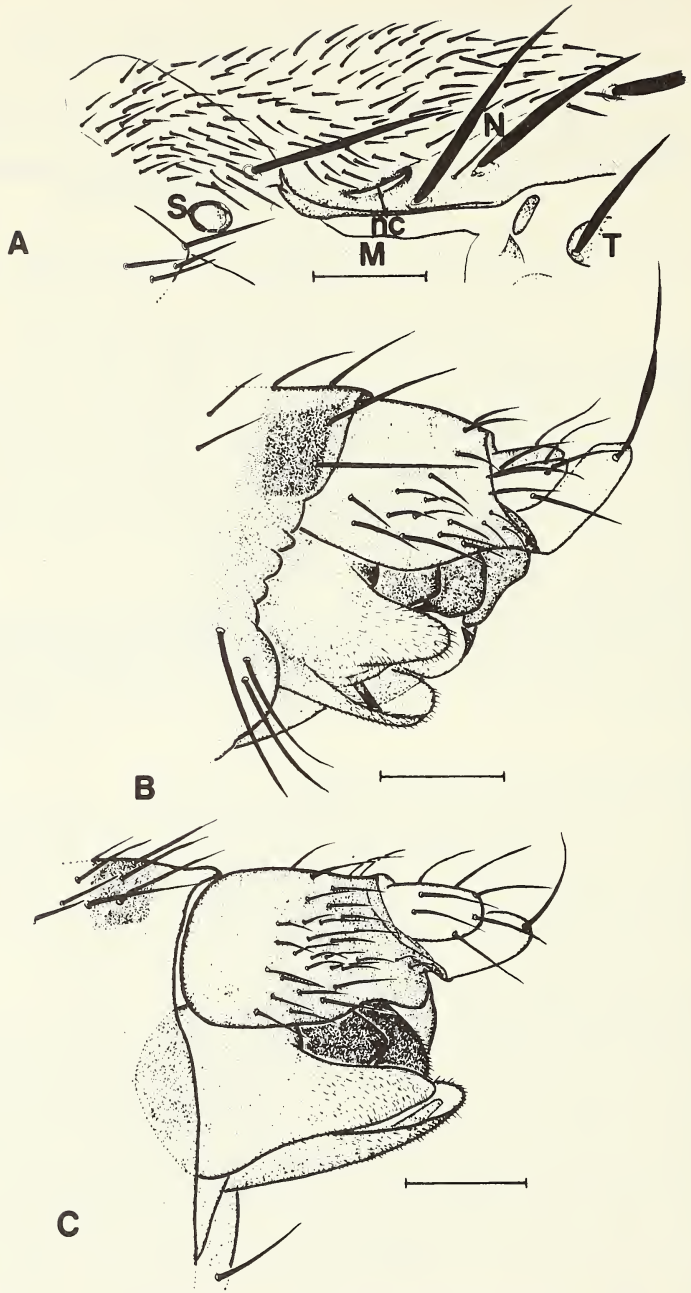

FIGURE 1

Megaselia males. A, *M. giraudii* notopleuron of left side (S = prothoracic spiracle, M = mesopleuron, nc = notopleural cleft, N = notopleural bristles, T = tegula near base of wing). B, *M. breviseta* hypopygium from left side. C, *M. correlata* hypopygium from left side. (Scale bars = 0.1 mm)

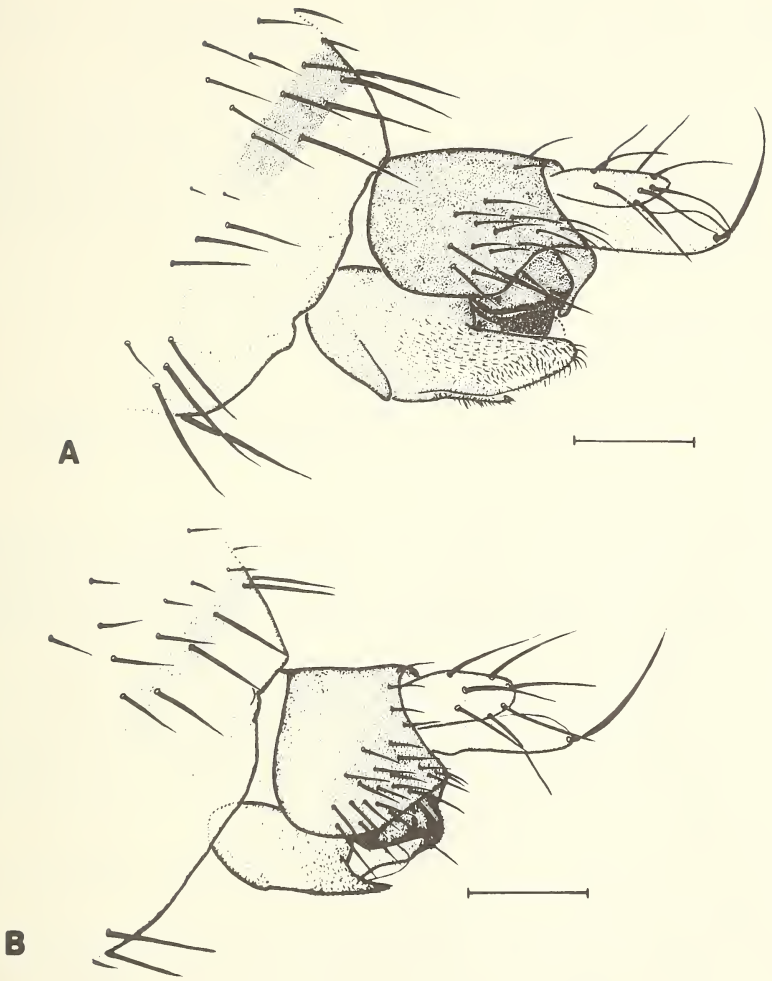

FIGURE 2
Megaselia males. Hypopygia viewed from left side. A, *M. densior*. B, *M. malhamensis*. (Scale bars = 0.1 mm)

Megaselia giraudii (Egger, 1862) (Figs 1A and 4A)
rata (Collin (in Wood), 1908)
dyari (Malloch, 1912).

I have examined the type series of *M. giraudii*, which are all females, and have designated a lectotype. This is indistinguishable from a female caught *in copula* with a male, which is itself indistinguishable from Wood's males of *M. rata*, these males have a distinct notopleural cleft in the place of the anterior notopleural bristle (Fig. 1A). I have also examined the holotype male of *M. dyari*, and can confirm the synonymy with *M. rata*, and hence with *M. giraudii*.

The notopleural cleft will immediately distinguish males of *M. giraudii* from all related species except *M. albicans* (Wood) and two new species (*M. malhamensis* and *M. parnassia*) described below, although in *M. malhamensis* the cleft is weakly developed.

The principal difference between *M. albicans* and *M. giraudii* is that in the former species the male cerci are relatively broad and each bears more than 11 hairs (Fig. 3A). In *M. giraudii* (and related species – see below) the cerci are relatively narrow and bear less than 11 hairs (Fig. 4A).

Megaselia malhamensis n. sp. (Fig. 2B)

Type locality

England, Malham Tarn, North Yorkshire

Type material

Holotype ♂ At window of Old Farm (Grid ref. 34/887674), Malham Tarn, North Yorkshire, 31 August, 1975, R. H. L. Disney. Deposited in collection of author.

Etymology

The species is named after the type locality.

Description

Only male known. HEAD: Frons broader than high with 50–75 hairs. Lower supra-antennal bristles less robust and shorter than upper pair. Antials about midway between upper supra-antennals and antero-laterals, which are a little higher on the frons. Pre-ocellars wider apart than upper supra-antennals and a little wider apart than distance between each and a medio-lateral bristle. Pre-ocellars only very slightly lower on frons than medio-laterals.

Proboscis with simple labella and pale labrum. Palps pale brownish with short bristles at most 1.2 × maximum width of palp. Third antennal segment brown with brownish arista.

THORAX: Brown, being darker on top. Notopleuron with two strong bristles behind and a long, somewhat inconspicuous, notopleural cleft in front. Mesopleuron bare. Scutellum with a posterior pair of bristles which are longer (almost 2×) and stronger than the anterior pair of bristles, which are themselves longer (almost 2×) than the finer hairs at rear of scutum.

ABDOMEN: Tergites 1–6 dark brown with very short sparse hairs, apart from those at rear of 6. Venter dusky with hairs on segments 3–6, but only conspicuous on 6. Hypopygium as Fig. 2B, being brown with yellowish anal tube.

LEGS: Largely yellowish to pale yellowish brown, apart from apical regions of hind femur and dorsal face of hind tibia, which are brown. Tarsal segments of front leg slightly shorter than 4, hairs below basal half of hind femur include 5–6 which are longer than those of antero-ventral row of distal half. Postero-dorsals of hind tibia somewhat spine-like in lower half.

WINGS: Length 1.58–1.59 mm. Costal index 0.43–0.44. Costal ratios 3.22:1.43:1. Costal cilia 0.10–0.11 mm. Veins yellowish brown. Vein Sc fades away in distal half. A minute hair at base of vein 3 (only 0.02 mm long). Three bristles on axillary ridge. Membrane slightly brownish tinged. Haltere with dark stem and yellow knob.

AFFINITIES: In the keys of Schmitz and Delage (1981) this species runs to couplet 38 (p. 675). It can be readily distinguished from *M. densior* and *M. giraudii* by the details of the hypopygium (cf. Fig. 2B with 2A and 4A). In particular the epandrium bears hairs which

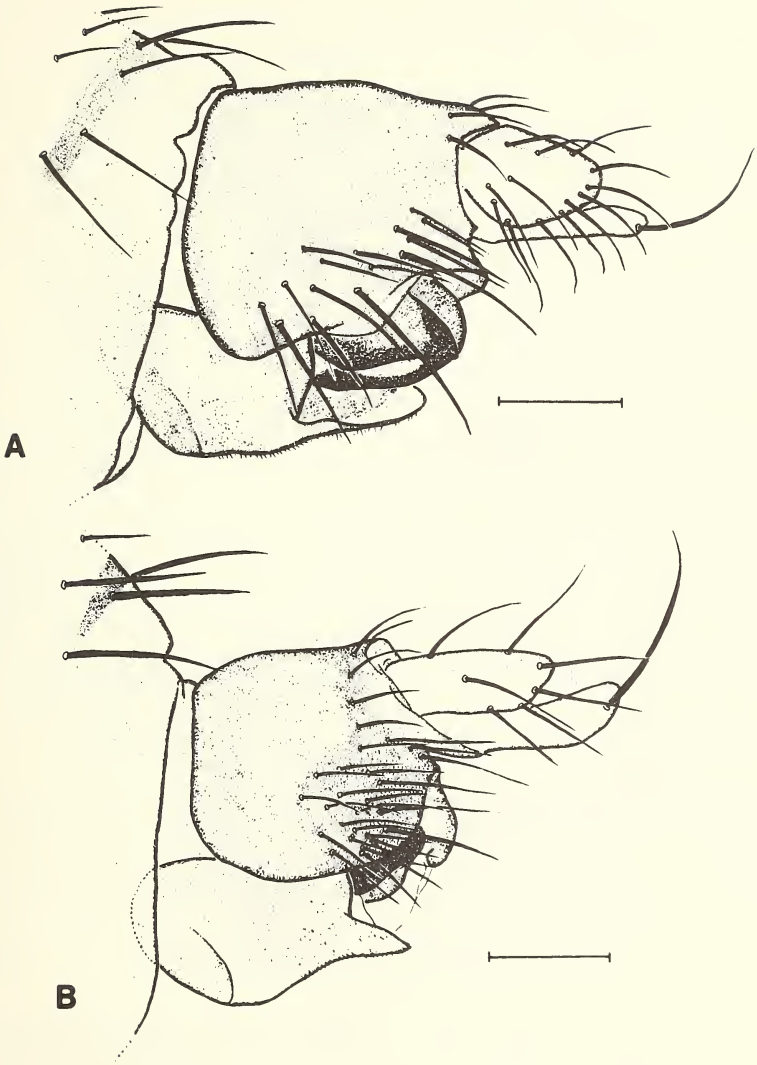

FIGURE 3
Megaselia males. Hypopygia viewed from left side. A, *M. albicans*. B, *M. septentrionalis*. (Scale bars = 0.1 mm)

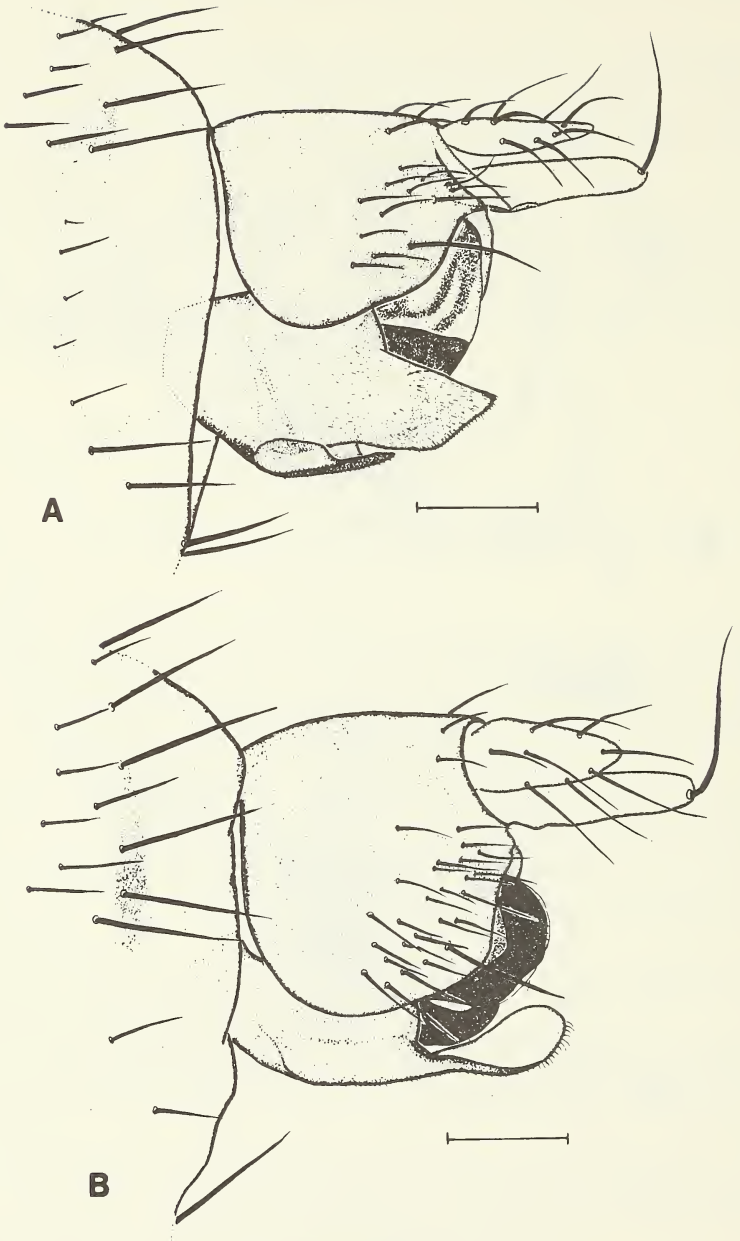

FIGURE 4
Megaselia males. Hypopygia viewed from left side. A, *M. giraudii*. B, *M. parnassia*
(Scale bars = 0.1 mm)

are all weaker than those on the cerci and the fine hairs on the posterior process of the left side of the hypandrium are directed apically and are relatively short. The yellowish legs, particularly the femora, will distinguish *M. malhamensis* from many related species.

Megaselia parnassia n. sp. (Fig. 4B)
giraudii Disney, 1980, nec (Egger, 1862). Misidentification.
Type locality
England, Malham Tarn, North Yorkshire.
Type material
Holotype ♂ At flower of *Parnassia palustris*, West Fen (Grid ref. 34/883672), Malham Tarn, North Yorkshire, 11 September 1975, R. H. L. Disney. Deposited in collection of author.
Etymology
The species is named after the flower at which the holotype was caught.
Description
Only male known: HEAD: Frons brown with about 80 hairs. Lower supra-antennals shorter than upper and both pairs much shorter than rest of frontal bristles. Antials about midway between antero-laterals and upper supra-antennals and a little lower on the frons. Pre-ocellars wider apart than upper supra-antennals but closer to each other than either is to a medio-lateral. All four of these bristles in a more or less straight transverse row. Proboscis with simple labella and brown labrum. Palps pale brownish with 7 short bristles. The longest bristle at most 1.4 × maximum width of palp. Third antennal segment and arista brown.
THORAX: Brown, being darker on top. Notopleuron with two strong bristles behind and a notopleural cleft in front. Mesopleuron bare. Scutellum with a posterior pair of bristles, which are longer (about 1.7 ×) and more robust than the anterior pair, which are clearly longer and stronger than hairs of scutum.
ABDOMEN: Tergites 1–6 dark brown with very short, sparse hairs except at sides of 2 and the clearly longer ones at posterior margin of 6. Venter dusky with hairs on segments 3–6. Hypopygium as Fig. 4B. Generally dark brown with brownish yellow anal tube.
LEGS: Generally brown, with the first pair being a little yellowish. Last two tarsal segments of fore legs subequal. Hairs below basal half of hind femur include 4–6 which are clearly longer than those of the antero-ventral row in apical half. Postero-dorsals of hind tibia distinctly spine-like in lower half.
WINGS: Length 1.83 mm. Costal index 0.43–0.44. Costal ratios 3.47:1.86:1. Costal cilia 0.15 mm. Veins pale brown. Vein Sc fades away in distal third. A strong hair at base of vein 3 (as strong as costal cilia at level of humeral cross vein). Axillary ridge with 5 bristles. Membrane greyish tinged. Haltere with dark stem and yellow knob.
AFFINITIES: In the keys of Schmitz and Delage (1981) this species runs to couplet 38 (p. 675). The presence of a notopleural cleft immediately distinguishes it from *M. densior*. The stronger hairs on the epandrium and longer hairs of the posterior process of the left side of the hypandrium distinguish it from *M. malhamensis* (cf Figs 2B and 4B). The more numerous hairs on the epandrium and more extensive development of the left side of the epandrium postero-ventrally will distinguish *M. parnassia* from *M. giraudii* (cf Figs 4A and 4B).

Megaselia plurispinulosa (Zetterstedt, 1860)
giraudii auctt. nec (Egger, 1862)
submeigeni (Wood, 1914)
nigrans Schmitz, 1935. **Syn. nov.**
Every supposed British specimen of *M. plurispinulosa* I examined proved indistinguishable from *M. nigrans*. I therefore began to suspect that the former species should be removed from the British List. However the characters given by Schmitz and Delage (1981) for the separation of these two species (in couplet 12 page 673) are evidently totally

unreliable. The pale propleuron and anteior part of the mesopleuron used to distinguish *M. plurispinulosa* from *M. nigrans*, as well as ratio of the distance between the tips of the first two thin veins compared with the distance between the second and third, are evidently too variable to allow certain separation. In view of this I have been basing my identification on the male hypopygium. Schmitz and Delage illustrated the hypopygia of the two 'species' in their Figs 449 and 451. Despite one figure showing the left side and the other showing the right these two figures portray evidently different epandria.

When I remounted the type of *M. submeigeni*, a female, I could not distinguish it from the female of *M. nigrans* collected with a male of this species. In view of this I borrowed the type of *M. plurispinulosa*. Despite being labelled as '♀' and 'H. Schmitz vidit 1925' it is in fact a male. The anal tube is badly damaged and the lobes of the epandrium cracked and distorted. In spite of this it is very clearly indistinguishable from *M. nigrans*. The supposed difference between the epandria of these two 'species' lies in the two figures of Schmitz and Delage only. I have no hesitation in establishing *M. nigrans* as a synonym of *M. plurispinulosa*.

Megaselia pseudogiraudii (Schmitz, 1920)
pseudopicta (Lundbeck, 1922). **Syn nov.**

I have compared the lectotype male of *M. pseudopicta* with a male of *M. pseudogiraudii* from Essex. The latter has a somewhat distinctive hypopygium. The hypopygium of *M. pseudopicta* is the same. On top of this *M. pseudogiraudii* is known to be a somewhat variable species (Schmitz and Delage 1981). At first sight *M. pseudopicta* is easily distinguished from *M. pseudogiraudii* by its orange-coloured thorax and paler median band on the abdominal tergites. However closer scrutiny of slide-mounted specimens reveals the same variations in the pattern of less pigmented and more pigmented areas on the frons, thorax and abdomen in both. The only difference lies in the intensity of the pigmentation in general. This character is clearly continuously variable. The same applies to the length of the hairs beneath the base of the hind femur and the sinuosity of vein 4. I can discover no consistent difference between the species and so conclude that *M. pseudopicta* is a synonym of *M. pseudogiraudii*.

Megaselia septentrionalis (Schmitz) (Fig. 3B)

Since reporting that specimens of this species recorded from England were, in fact, *M. badia* (Disney 1985a) I have received specimens from Scotland which prove to be the true *M. septentrionalis*. The species is accordingly restored to the British List.

The species is somewhat variable and some specimens will key out at couplet 38 (p. 675) in the keys of Schmitz and Delage (1981). Their description of this species is incomplete as the cut-off point of the Lieferung published in 1981 is in mid sentence towards the end of their description of the head! However I can report that the males lack a notopleural cleft and all legs are dominantly brown. The anal tube relative to the length of the dorsal face of the epandrium is longer than in *M. breviseta* and *M. correlata* (cf. Figs 1B, 1C and 3B) and the wing is distinctly grey to the naked eye but more or less clear in the latter two species.

The specimens from Scotland were all collected in May 1981 from Loch Garten (Grid ref. 28/9718) (J. A. Owen) and Flanders Moss (Grid ref. 26/623973) (J. M. Nelson).

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SOME RARE OR LOCAL COLEOPTERA FROM LOWLAND WETLAND IN NORTH NORTHUMBERLAND

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In April 1984 I spent a weekend collecting in the Wooler area of Northumberland (VC 68) to improve upon our limited knowledge of this relatively remote and poorly worked part of England. Amongst the large number of sites visited, four of the lowland wetlands were particularly good for Coleoptera and these are detailed below. Five species are new for north-east England.

Site 1

Kimmer Lough (Grid ref. NU1217). At 70 m O.D. it is probably the only reasonably undisturbed lowland peat bog left in Northumberland. There appear to be no previous entomological records for this site. The area of interest surrounds a small lake which is mostly steep sided with fringing *Juncus* but has a *Sphagnum* swamp in the west corner and *Phragmites* at the eastern margin. Fences divide the surrounding land into two halves, of which the north-east is grass pasture with patchy *Salix*, and the south-west is peat bog. The latter is a mosaic of *Salix*, *Myrica*, *Sphagnum* and open water, and *Calluna* and *Erica tetralix*. A deep recently cut drain feeds off from the south-east corner.

Site 2

Ford Moss (Grid ref. NT9637). The moss is a nature reserve of the Northumberland Wildlife Trust and is described in their handbook. Much of the reserve has become wooded but the west half remains open. My collecting was mainly along the boundary of these two habitats.

Site 3

Campfield Bog (Grid ref. NT8638). A kettlehole, which is already known for its interesting Hydradephaga (M. Eyre, pers. comm.). The site is a deep hollow between

arable fields to north and south and old railway embankments to east and west. Most of the bog is shaded by mature *Betula* and *Salix* with swampy *Sphagnum*, *Juncus* and open water beneath.

Site 4
The River Tweed at St. Cuthbert's (Grid ref. NT8642). Much of the rivershore is silt and fine sand with *Salix* overhead. The islets have coarser sand and shingle and are generally choked with *Heracleum mantegazzianum*. The height and density of trees increases to the south, with consequent increase in shade.

A few of the more interesting species of Coleoptera are listed below with comments on their status in Northumberland and Durham. Two *Agabus* species collected by M. Eyre in July 1984 are included.

Carabidae
Pterostichus minor (Gyll.) Sites 1 and 3. Very rare and only known from Prestwick Carr (Bold 1872 *Nat. Hist. Trans. Northumb.* **4**: 1–117), although it has recently been more widely recorded. This species has a relict distribution and is characteristic of fens (M. Luff, pers. comm.). *Trichocellus cognatus* (Gyll.) and *placidus* (Gyll.). Site 1. This is an unusual juxtaposition of these local species, typical of moorland and fen respectively.

Haliplidae
Haliplus lineolatus Mann. Site 1. Hitherto very locally distributed in artificial lakes (Eyre and Foster 1984, *Entomologist's Gaz.* **35**: 111–135).

Dytiscidae
Agabus affinis (Pk.) Site 1. A local sphagnum bog species (Eyre and Foster 1984, *ibid.*). *Agabus melanocornis* Zimm. Site 1. Local, in temporary ponds and peaty conditions (Eyre and Foster 1984, *ibid*).

Ptiliidae
Acrotrichis parva Rossk. Site 1. New to the north-east but only recently recognized in Britain where it is widespread (Johnson 1974, *Entomologist's mon. Mag.* **111**: 177–183).

Leiodidae
Catops coracinus Kellner. Site 2. One previous record, near Wooler (Bold 1872, *l.c. supra*). A widespread but mainly northern species.

Staphylinidae
Carpelimus subtilis (Er.) Site 4. One previous record, from Winlaton Mill (Donisthorpe 1909, *Entomologist's Rec. J. Var.* **21**: 231). Very local in Britain. *Platystethus cornutus* (Grav.) Site 4. The northernmost British locality. There is one published record for County Durham (Hammond 1971, *Entomologist's mon. Mag.* **107**: 93–111) and I have recently taken it there in two new localities. *Stenus comma* LeConte. Site 4. Only recently found in north-east England (Reid 1985, *Entomologist's mon. Mag.* **121**: 260) and possibly spreading northwards. *Stenus nitens* Stephens. Site 1. New to north-east England. This locality neatly fills the gap between recent Scottish sites (Sinclair 1983, *Entomologist's mon. Mag.* **119**: 220) and those from Yorkshire southwards. *Stenus niveus* Fauvel. Site 1. New to north-east England. A very local relict lowland bog species, scattered throughout Britain. *Euaesthetus laeviusculus* Mann. Site 2. *Euaesthetus ruficapillus* Bois. & Lac. Site 1. These are the first species of this genus recorded from the north-east. Both are local in marshes throughout Britain but more frequent in the south. *Lathrobium longulum* Grav. Site 1. Only recorded from the River Irthing (Bold 1872, *l.c. supra*) and Gibside (Bagnall 1905, *Entomologist's Rec. J. Var.* **17**: 331–333). Rarer in north Britain. *Lathrobium zetterstedti* Rye. Sites 1 and 2. Previously known from Wearhead (Thompson 1929,

Vasculum **15**: 37). *Tachyporus transversalis* Grav. Sites 1 and 2. Only known from Cold Martin Moss (Hardy 1871, *Hist. Berwicksh. Nat. Club* **6**: 251–267) which Bold (*l.c. supra*) mistakenly refers to as Henhole. A lowland acid bog species. *Hydrosmecta thinobioides* (Kr.) Site 4. New to Northumberland, but known from Durham (Bagnell 1908, *Entomologist's Rec. J. Var.* **20**: 33–34). A local species of riverbanks. *Atheta fallaciosa* (Sharp) Site 1. Only otherwise known from Sweethope (Bold, *l.c. supra*). More frequent in North Britain.

Pselaphidae
Pselaphus heisei Herbst. Site 1. Rare according to Bold (*l.c. supra*) and there are few recent records.

Coccinellidae
Coccinella hieroglyphica L. Site 1. Rare according to Bold (*l.c. supra*), there are surprisingly few recent records considering its association with *Calluna*. *Halyzia sedecimguttata* (L.) Site 3. New to north-east England. Associated with *Betula*. Recent British localities are in central Scotland and along the south coast of England (J. Muggleton, *in litt.*).

Chrysomelidae
Lochmaea crataegi (Forst.) Site 2. Previously only known from Twizell (Bold, *l.c. supra*). Rare in north Britain.

Curculionidae
Barypeithes sulcifrons (Boh.) Site 2. Recorded without further detail from North Northumberland by Bold (*l.c. supra*). Very local and mainly northern in Britain.

As the genus *Stenus* Latreille has been intensively studied in north-east England by M. Eyre and myself it was surprising to find two new species in one locality. This, together with the other species listed above, suggests that Kimmer Lough has a rich and unusual coleopteron fauna poorly represented elsewhere in north-east England. At present Kimmer Lough is not protected. Campfield Bog also seems worthy of further study and conservation.

Acknowledgements
I thank Garth Foster for the *Haliplus* identification, Martin Luff for carabid information, and Mick Eyre for allowing me to pick his brain and files for references, for use of his hydradephaga records and for constructive criticism of the manuscript. The Northumberland Wildlife Trust kindly allowed access to Ford Moss.

BOOK REVIEWS

The Birds of Yorkshire by **John R. Mather**. Pp. 613, with 119 black & white photographs, 96 line drawings and 35 selected distribution maps. Croom Helm. 1986. £40.

This latest mammoth work on the birds of Yorkshire, the successor to Thomas Nelson 1907 and Ralph Chislett 1952, has really done justice to Yorkshire's birds by virtue of the space available.

The first 10 per cent of the book begins with a description of the county followed by chapters on the development of ornithology, bird protection and short sections on sites of special interest. Then follows the major section of the book covering the systematic list which follows K. H. Voous. The author gives an account of the historical and present status and distribution of each species, which is well researched and written in a very

readable style. Three types of record have been included: historical records published by Nelson and Chislett, records accepted by the Ornithological Committee of the Yorkshire Naturalists' Union and B.B. and records accepted by YNU but not submitted to B.B.R.C. The last group of records mainly emanate from Flamborough. Illustrations are provided by four groups of excellent photographs including good portraits of both Nelson and Chislett, some old ones of famous wildfowlers and Bempton egg collectors, and areas of Yorkshire, some taken from the air. The remainder are a collection of mostly rare birds found in the county over the past 35 years. Scattered through the text are 119 accurate and attractive vignettes. Clear distribution maps have been produced for the less common breeding species. The inside covers contain a useful map of old Yorkshire, depicting the six 100 km square O.S. map numbers together with the five Watsonian vice-county divisions and 10 km squares. 404 fully acceptable recorded species appear in the text and in addition 12 species which at one time or another have had a claim for a place on the county list have now been fully recorded. There are now 138 species breeding in the county which is a greater number than at any time this century.

Since 1952, 84 species have been added to the county list, mostly as a combined result of regular sea watching, a much larger number of ringers using mist nets at both coastal and inland sites together with a great increase in the number of active observers in the field during the last 35 years.

Instead of defining each species with a brief status summary, a much more accurate account is given in the wealth of the text which will prove invaluable especially to less knowledgeable readers. Some interesting derivations of common names are included and the author has drawn on the wealth of data now available from local and BTO surveys. Particularly fine examples include Canada Goose, Guillemot (where 9 of the 13 original pages written by Nelson have been included intact), Kittiwake and Cormorant.

The author has acknowledged the great number of Yorkshire birdmen who have helped to make this such an outstanding county avifauna, which will prove to be the most important source of reference for many years to come.

BL

Biology by **Peter H. Raven** and **George B. Johnson**. Pp. xxxii + 1293, fully illustrated. Times Mirror/Mosby College Publishing, St Louis. 1986. £27.50.

This has to be the ultimate in biological textbooks, providing as it does a wealth of encyclopedic information, opulently presented. However, to encompass this, the book measures 28 × 22 × 6 cm and weighs nearly 3½ kilograms! It has been aimed at a world market and will provide an admirable text for sixth-form courses and first year/foundation courses in biological sciences for colleges and universities. It is also strongly recommended as a basic source of information for those who teach courses up to and including these levels. Although somewhat higher in price than students normally seem willing to pay, this book nevertheless represents fantastic value.

MRDS

Wild in London by **David Goode**. Pp. vi + 186, with b/w and colour illustrations. A Shell Book/Michael Joseph. 1986. £8.95.

The author makes it clear in his acknowledgements that this is a personal selection of London sites of value to wildlife, not an exhaustive survey. It is interesting to compare his approach with that of R. S. R. Fitter's classic work, *London's Natural History*, first published in 1945. Although the main appeal of *Wild in London* will probably be to those nature-lovers who live in the London area and want to know where they can go to see a range of fauna and flora and what species they can reasonably expect to encounter there, most city dwellers will have access to similar sites in their own area and will find this book interesting and illuminating. The very readable text is well complemented by excellent colour photographs.

VAH

NOTES ON THE LEECH, *HELOBDELLA STAGNALIS*, AS A HYPERPARASITE OF THE MEDICINAL LEECH, *HIRUDO MEDICINALIS*, IN A LAKE DISTRICT TARN

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Introduction

Sixteen species of leeches (Hirudinea) occur in the British Isles; the majority prey on invertebrates but two species are ectoparasites of fish, one is an ectoparasite of water-birds, one is an ectoparasite of water-birds and mammals, and the medicinal leech is an ectoparasite of mammals, amphibians and fish (Elliott and Mann 1979). The only records of leeches parasitizing other leeches are all for young *Glossiphonia complanata* (L.) (see references in Elliott and Mann 1979). *Helobdella stagnalis* (L.) has been found attached to other leeches in North America but was not feeding (Sawyer 1972).

The present paper describes changes over four years in the numbers of *H. stagnalis* on medicinal leeches (*Hirudo medicinalis* L.) in a Lake District tarn and examines some aspects of the spatial distribution of *H. stagnalis*.

Materials and Methods

All samples were obtained from a Lake District tarn with a surface area of *c.*2546 m^2, about 40 per cent of which is over shallow water less than 0.5 m deep (for a detailed description of the tarn, see Elliott and Tullett 1986).

Samples of medicinal leeches were taken every two weeks from March to November in 1982, 1983, 1984 and 1985 (see Fig. 1). The catch-per-unit effort was the number of leeches taken by two operators in one hour. A few leeches were removed from stones in shallow water near the shore but the majority were caught as they swam towards the operators wading in the water. All leeches were returned to the tarn after they had been weighed in the laboratory (for a detailed description of the sampling methods see Elliott & Tullett 1986). The number of medicinal leeches parasitized by *Helobdella stagnalis* was recorded for each sample and the number of *H. stagnalis* per host was also noted.

Results

The total catch of medicinal leeches for the four years of this study was 1296 of which 196 (15 per cent) were carrying *Helobdella stagnalis*. The number carrying *H. stagnalis* varied considerably between years from 11 (7 per cent of total catch) in 1984 to 92 (18 per cent) in 1983. There was also considerable variation within each year but this variation followed no obvious seasonal pattern (Fig. 1). Less than 50 per cent of the medicinal leeches in each sample were carrying *H. stagnalis*, and the number of *H. stagnalis* per host exceeded three on only four medicinal leeches, carrying five, eight, thirteen and thirteen respectively (in three samples marked with asterisks in Fig. 1). All sizes of *H. stagnalis* were found on the medicinal leeches, and some *H. stagnalis* taken in June were carrying eggs or young. As the medicinal leeches were brought back to the laboratory for weighing, it was possible to observe through a microscope *H. stagnalis* feeding on its host. The proboscis was inserted deep into the body wall of the host and the anterior portion of the body contracted regularly. It was therefore concluded that *H. stagnalis* was a parasite of the medicinal leech. The term 'parasite' is used here to describe a species that utilizes a host as a habitat and derives its nutrition from that host (see discussion in Anderson and May 1978). Thus the medicinal leech is a parasite and *Helobdella stagnalis* is a hyperparasite.

The distribution of the hyperparasites (excluding eggs or young carried by a parent) within the host population was examined by comparison with a Poisson series, the probability distribution for random events. As the number of parasites per host rarely exceeded three and there was a high proportion of unparasitized hosts in each sample, the

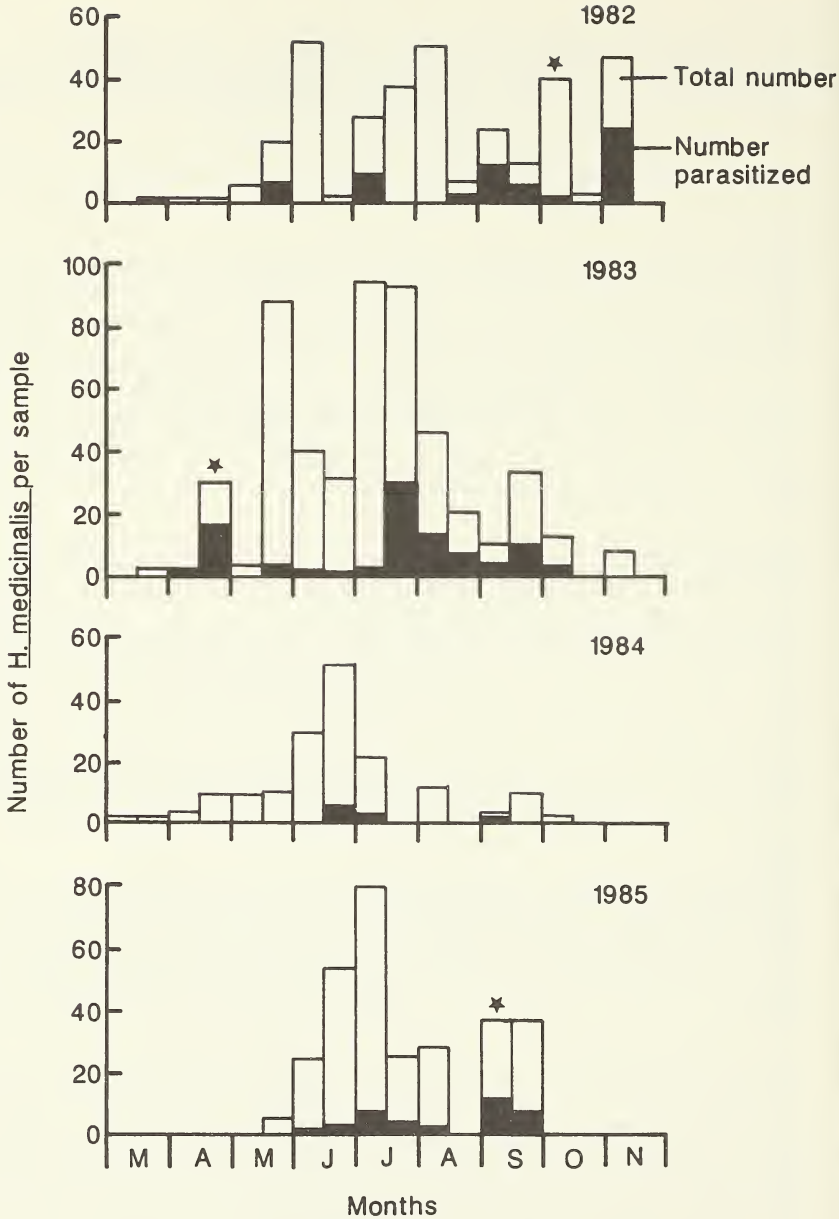

FIGURE 1
Total number of medicinal leeches (*Hirudo medicinalis*) taken in each sample and number of medicinal leeches parasitized by *Helobdella stagnalis* (shaded portion of each column); the three asterisks indicate samples in which there were more than three *H. stagnalis* per medicinal leech.

simplest test was to compare the observed number of zero values (i.e. number of hosts not parasitized) with the expected number for a Poisson series with the same mean as that of the sample (see methods of Chakravarti and Rao 1956, Elliott 1977). There was good agreement between observed and expected values for all samples except two in which the expected values were significantly less ($P < 0.05$) than the observed values (Fig. 2). The two exceptions were two of the three samples with medicinal leeches carrying more than three parasites (samples marked with asterisks in 1983 and 1985 in Fig. 1).

Therefore, apart from the two samples with medicinal leeches carrying a high number of parasites, there was good agreement with a Poisson series. It was concluded that the distribution of the hyperparasite within the population of the host species was usually random.

Discussion

The present investigation not only provides the first record of *Helobdella stagnalis* feeding on another leech species, but also shows that it is a frequent hyperparasite of the medicinal leech, *Hirudo medicinalis*. In contrast to previous observations on *Glossiphonia*

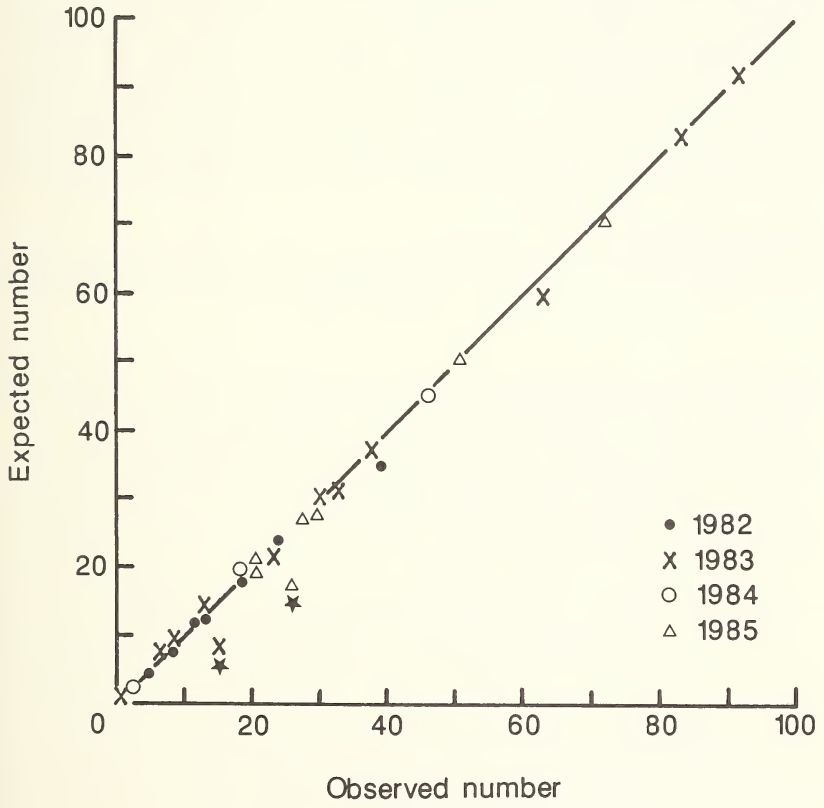

FIGURE 2

Comparison of observed and expected values for the number of medicinal leeches not parasitized by *H. stagnalis* in each sample (expected values were estimated by the first term in a Poisson series, asterisks indicate the two samples for which there was a significant difference between observed and expected values).

complanata feeding on other leeches (see introduction), *H. stagnalis* did not kill its host or produce any obvious reactions. The behaviour of its host appeared to be similar to that of unparasitized medicinal leeches. Medicinal leeches were not the only hosts for *Helobdella stagnalis* which feeds on a variety of other invertebrates including larvae of aquatic insects, oligochaetes, amphipods, aquatic snails, Copepoda and Cladocera (Elliott and Mann 1979).

There is a large amount of information on the distribution of parasite numbers within natural populations of their hosts and the observed patterns are usually over-dispersed (aggregated) with relatively few hosts carrying the majority of the parasites (see reviews by Anderson and May 1978, Whitfield 1979, Anderson 1979). This aggregated distribution probably facilitates the stable co-existence of the host-parasite association. There are a few reports of random and under-dispersed (regular) distributions but these usually occur in laboratory populations, or within specific strata of a wild host population such as a particular age-class, or when the initial invasion of the host population has just occurred.

The random distribution of the hyperparasite within the host species in the present study is therefore not the usual pattern found in host-parasite associations. The hyperparasites were not confined to a particular stratum of the host population, and the persistence of the random distribution over four years indicates that it is not simply due to an initial invasion of the host population. It is possible, however, that the method of collecting chiefly swimming medicinal leeches produced biased samples because heavily-parasitized leeches may be too weak to swim, and recently-satiated leeches do not swim but would be an easy prey for *H. stagnalis*. None of the hosts taken in the present study, including the three heavily parasitized individuals showed any obvious signs of weakness. Nothing is known about the long-term survival of the parasitized hosts and there is clearly a need for further investigations.

Acknowledgements

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ASPECTS OF THE BREEDING BIOLOGY OF RAVENS IN TWO UPLAND REGIONS OF NORTH WALES

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The Raven *Corvus corax* is a conspicuous and important resident of the upland avifauna throughout Wales, though it is common also around many seacliffs and rocky islands. Here, as elsewhere, its food habits can lead locally to conflict with sheep farmers since sheep carrion forms a large part of the omnivorous diet (Bolam 1913, Marquiss *et al.* 1978).

From 1978 to 1985, a complete census was made of breeding Ravens in Snowdonia and in the contiguous and contrasting upland region to the east of these mountains (Dare 1986). Earlier, Ratcliffe (1962) had compared Raven population density, breeding success and nest site features in part of Snowdonia with that of Ravens in north-west England and southern Scotland, while Allin (1968) provided breeding data for Ravens on Anglesey and in northern Snowdonia. In mid-Wales recently, the ecology and breeding biology of Ravens in the Cambrian Mountains have been studied with particular reference to local land use, mainly sheep farming and forestry (Newton *et al.* 1982, Davis & Davis 1986). Large-scale conversion of moorlands to conifer forests, with a consequent decrease in Raven food supply, has resulted in recent marked declines in Raven numbers breeding in north-east England and southern Scotland (Marquiss *et al.* 1978, Mearns 1983).

During my 1978–85 census, incidental observations were made on certain aspects of Raven breeding biology which supplement the earlier findings from the north Wales uplands. The present paper details such information for the whole of Snowdonia and an adjoining moorland block; it covers nest sites, the breeding season, breeding success in relation to afforestation, and juvenile dispersal.

Study Area and Raven Population

The area covers 1,403 km^2 and comprises two distinct geological and agricultural regions: (A) Snowdonia – 926 km^2 of mountainous terrain west of the river Conwy and north of the Vale of Ffestiniog; (B) Migneint-Hiraethog – 477 km^2 of moorland and enclosed hill farms extending eastwards from the upper reaches of the river Conwy. Land use and physical features are summarized in Table 1. The rugged mountain ranges and glaciated valley systems of Snowdonia contrast sharply with the more gently undulating and intensively farmed landscape around the two moorland blocks of Migneint and Hiraethog.

Parameters of the Raven population are also summarized in Table 1 (from Dare 1986). Snowdonia supported 97 breeding territories at a high mean density, whereas the Migneint-Hiraethog region held only 20 territories and at a much lower density. The density in Snowdonia is the second highest yet reported for Ravens in Europe, being exceeded only in central Wales (Davis & Davis 1986). Breeding success in the study area is similar to that reported earlier and to that of Ravens in central Wales.

Methods

The breeding data were obtained by systematic searches for, and inspections of, all the many likely rock and tree sites in the study area. For each nest, the following details were recorded: grid reference, altitude above sea level (from 1:25000 maps), type of site (natural cliff, quarry or tree), height of nest above ground, degree of exposure and direction faced (rock nests only). Details of all nest sites have been filed with the Royal Society for the Protection of Birds, Wales Office. Most Raven nests were inaccessible and many were not in viewable positions. These factors together with the large size of study area precluded a thorough study of breeding biology. Instead, annual samples of nesting territories were examined, their number and distribution varying according to the census

priorities. Nests were inspected on an opportunistic basis with the aid of binoculars (× 10) or telescope (× 20).

Nest Sites

Ravens used a wide variety of sites, with a marked difference between the two regions (Table 2) which reflected the relative availability of safe rock and tree sites. In the 97 Snowdonia territories, nests were built mainly on cliff and quarry faces at intermediate

TABLE 1

Physical features, land use, and Raven breeding population in each region of the study area (from Dare 1986)

	Snowdonia	Migneint-Hiraethog
Land Area (km^2)	1,403	477
Maximum Altitude (m)	1,085	688
Land above 150 m (%)	85	96
Land above 450 m (%)	24	11
Land Use (% of total area):		
sheepwalk	66	48
quarry wasteland	3	0
enclosed pastures	16	47
deciduous woodland	3	1
conifer forests	8	4
lakes	3	<1
urban	1	<1
Raven Population:		
No. of breeding territories	97	20
Mean breeding density (km^2/pair)	9.5	23.9
Nest spacing (km) (= mean nearest neighbour distance)	2.00±0.63	3.55±1.01
No. young reared per successful pair	2.5	2.5

levels on the mountainsides (Fig. 1). The mean nest altitude was 342 m but more than half of the sites were between the 150 m and 375 m contours. The few tree nests were between 165 m and 495 m, the highest being very close to the tree-line. In the 20 Migneint-Hiraethog territories, most nest sites were in trees and the mean altitude was similar to that in Snowdonia. A few pairs switched between rock and tree sites in each region.

In Snowdonia, nest crags ranged in size from impressive precipices down to low and partly vegetated bluffs protruding through thickly wooded escarpments. Nests were built typically on open ledges and often under overhangs, thus affording some protection from falls of snow, ice or rock; 34 per cent of nests were very exposed and only 15 per cent were in very sheltered positions (Table 2). Some pairs were very tolerant of human activities and bred successfully, for example, within 50 m of a popular climbing route or within 200 m of machinery and explosions in an operational quarry.

The directions faced by 75 of the more exposed ledge nests on crags, and by 18 others in slate and granite quarries, were noted. Most (63 per cent) crag nests faced the south-east (E-S) quadrant, away from prevailing westerly winds, with fewest (17 per cent) facing westerly (SW–NW). In quarries, on the other hand, 56 per cent of nests faced between north and north-west. Directions appeared to be governed more by land-form than by innate or weather-related preferences, for eastern slopes in much of Snowdonia tend to be

more precipitous whereas western slopes often rise gradually and are the most amenable for quarrying. Allin (1968) also found no evidence for any aspect preference in north Wales.

In Migneint-Hiraethog, where large crags are rare, some Ravens resorted to unusual rock sites. Two of the 7 rock-nesters nested annually in narrow river gorges, while two others used 8–10 m high rock scarps in fields and only 200–300 m from farms. Such nests were vulnerable to persecution by farmers and seldom succeeded.

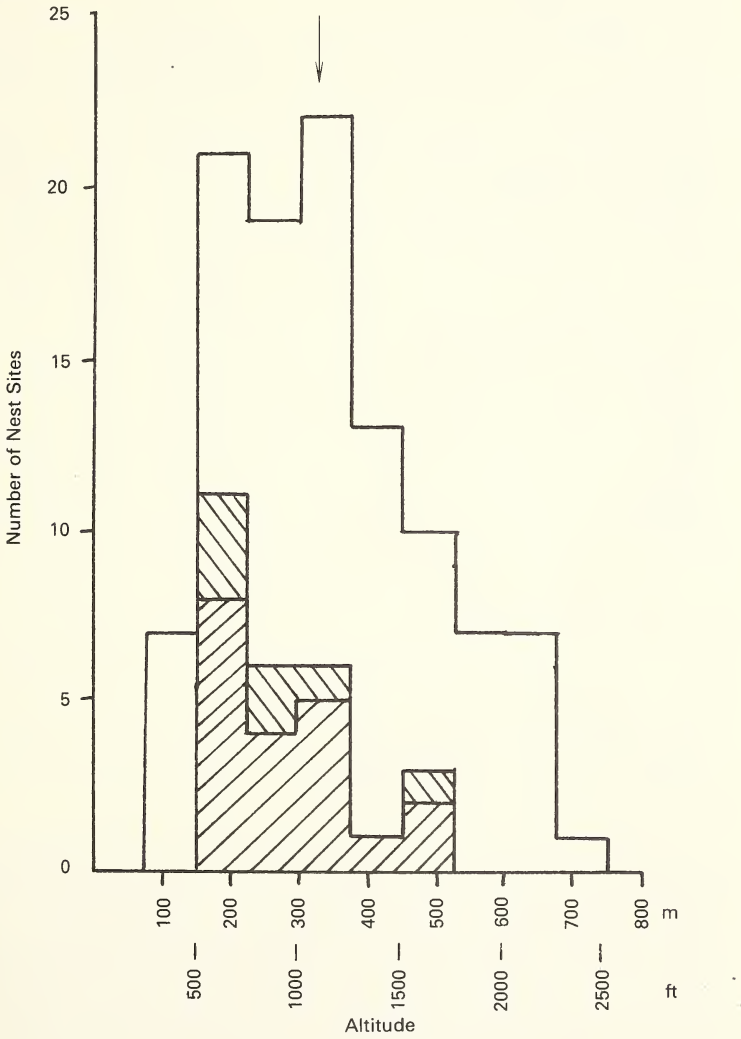

FIGURE 1
Altitudinal distribution of 107 Raven nest sites in Snowdonia.
all sites □, quarry sites ▨, tree sites ▧; the arrow denotes the mean value.

TABLE 2
Nest site features of Ravens in the study area

	Snowdonia	Migneint-Hiraethog
Nest Altitude - mean (m)	342	334
- range (m)	85 – 690	210 – 590
Nest Sites (Territory frequency)		
rock - natural cliffs	72 (74%)	5 (25%)
- quarries	18 (19%)	1 (5%)
trees	3 (3%)	12 (60%)
trees/rocks	4 (4%)	2 (10%)
Rock Nest Positions		
exposed ledge (exposure degree 5)	52 (9)	9 (2)
more sheltered ledge (" " 4)	64 (24)	1 (1)
ledge behind sapling (" " 3)	15	0
gullies (" " 2)	9	0
clefts/fissures (" " 1)	11	4
holes (" " 0)	3	0
	154	14
Tree Nest Species (No. nests)		
Scots pine	4	7
Spruce	0	5
Larch	0	3
Ash	3	0
Birch	0	2
Beech	0	2
Sycamore	0	1
Rowan	1	1
	8	21
Nest Number per Territory		
1	40	8
2	43	8
3	9	4
4	3	0
5	2	0
Mean	1.8	1.8

Note: rock nest positions in parentheses refer to vegetated cliffs.

Tree-nesters favoured conifers in remote hillside spinneys and shelterbelts, and nests were usually at heights of 11–18 m. However, in secluded and steep-sided moorland valleys, several nests were in small birch and rowan trees and only 4–6 m above the ground. Eight species of tree were utilized for 29 nests (Table 2).

The occurrence of alternative nests within a Raven territory is well recorded (Ratcliffe 1962, Allin 1968). In this study, the mean number of nests available per territory was 1.8 (Table 2). Most pairs used only one or two nests during the 8 year period, and none used more than four. The largest nest, about 1–1.5 m tall, comprised three distinct structures stacked above one another. On cliffs, alternative nests were often only 2–30 m apart, but in four territories (and including tree-nesters) the spacing could be up to 2–3 km.

Some Ravens shared the larger cliffs with nesting Peregrines *Falco peregrinus* and (or) Buzzards *Buteo buteo*. In three localities, all three species bred successfully within a 400 m sector for several years. In two small quarries, Ravens and Peregrines both nested

successfully even though only 50–100 m apart (B. Boothroyd, J. C. Barnes, *pers. comms.*). However, in two other territories, Raven clutches were deserted when Peregrines selected eyries only 2 m and 25 m from the occupied Raven nests. At a third site, a regular Raven cliff was abandoned to Peregrines a year after the falcons began prospecting and had struck one Raven repeatedly (L. Taylor, pers. comm.). Old Raven nests were taken over by Peregrines in at least three territories, by Buzzards (5) and by Kestrels *F. tinnunculus* (4). One Raven pair usurped a former tree nest of Buzzards and forced the latter to move to a new site 1.7 km away.

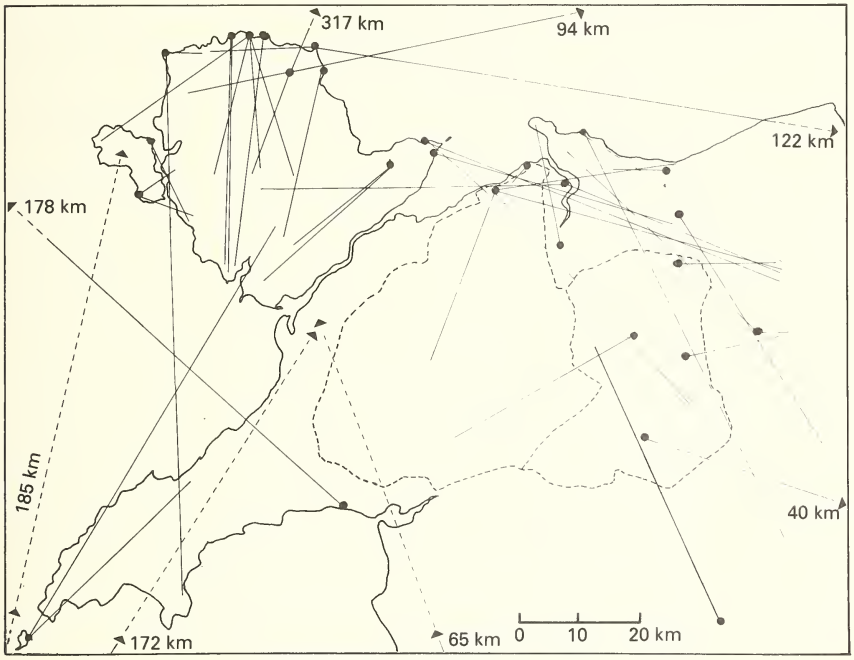

FIGURE 2
Movements of Ravens ringed as pulli in and around the study area (enclosed by dashed lines). Ringing sites shown by filled circles; movements into north Wales shown by dashed lines with arrows.

Breeding Season

The limited 1978–85 observations supplement earlier data for the study area (Allin 1968, and *in litt.*) and together enable the timing of the breeding season in these uplands to be outlined more clearly than hitherto (Table 3). Breeding was protracted above 200 m altitude and lasted from late February until late May or early June, with considerable overlap between stages. Each stage was spread over 5–7 weeks, excluding any repeat attempts.

For pairs above 305 m, Allin (1968) had found that 10 per cent of 48 clutches (mean size 5.1 eggs) were completed by 28 February, 37 per cent by 10 March, and 92 per cent by 21 March, with peak completion during 11–21 March. Although he presented no data on hatching or fledging dates, these can now be estimated for his clutches by applying the mean incubation (20–21 days) and nestling (45 days) periods measured in mid-Wales by

TABLE 3
Breeding chronology of upland Ravens in north-west and central Wales

	Study Area, 1978–84		Study Area, 1946–72	Cambrian Mountains, 1975-78	
Breeding Stage	Earliest	Latest	Earliest	Earliest	Latest
Nest building	24 Jan. (1981)	8 Mar. (1980)			
	28 Jan. (1979)	11 Mar. (1978)			
First egg	*c.*25 Feb. (1978)	7–8 Apr. (1984)*	19 Feb. (1959)	18 Feb.	7 Apr.
	28 Feb. (1980)		24 Feb. (1972)	5 Mar. (median)	
Hatching	*c.*20 Mar. (1981)‡	28 Apr. (1984)	14 Mar. (1959)	10–11 Mar.†	27–28 Apr.†
	*c.*22 Mar. (1979)				
Fledging	20 Apr. (1980)	10 Jun. (1982)§		24–25 Apr.†	7–8 Jun.†
		*c.*14 Jun. (1982)§			
Authority	This study		E. K. Allin, *in litt.*	Davis and Davis (1986)	

Notes: First egg dates in study area calculated from incomplete clutches, except 1984* which was back-dated from a hatching clutch on 28 April using a 20–21 day incubation period (Davis and Davis, 1986); repeats excluded.
† dates by extrapolation from given first egg dates using the mean incubation and nestling periods stated by the authors.
‡ estimated from a *c.*7 day old brood on 26 March.
§ broods in nests and fledging imminent.

Davis and Davis (1986). In my study area, hatching should therefore begin around 16–20 March, and peak during 31 March–11 April, while fledging should start about 30 April–4 May and peak during 15–26 May. My observed 1978–85 ranges (Table 3) accord reasonably with these deductions. There was no evidence that very late Snowdonia broods related to repeat clutches except in one case in 1984 where there were signs of an earlier failure in the alternative nest. In general, Table 3 shows that the breeding season in the study area appears to be only a few days later than in central Wales uplands; it is 1–2 weeks later than on lowland Anglesey nearby (Allin 1968, and *in litt.*).

TABLE 4

Breeding activity of Ravens in relation to the proportion of the nest territory covered by closed conifer forest

Percent Conifers within 1.5 km of nest	Territory	1978	1979	1980	1981	1982	Comments
71–80	A	o	o	o	x	p	new pair 1981–82; none again 1983–84.
61–70							
51–60	B	✓	(x)	(x)	✓	✓	
	C		?	✓	?		
41–50	D	?	✓	?	✓		
	E		?	o	x	o	Peregrine take-over in 1980–82.
	F	?	p	x	x	x	climbing disturbance each year.
31–40	G	p	p	?	(x)		
	H	?	✓	p	✓	✓	

Notes: ✓ = bred, successful; p = pair, did not breed;
x = bred, failed; o = no birds present;
(x) = bred, apparently failed; blank = no observations made.
? = bred, result not known;

Breeding Success and Afforestation

Overall breeding success was similar in both regions (Dare 1986) with, on average, 58–73 per cent of nest attempts producing some fledged young, and 2.5 young being reared per successful pair. Causes of nest failure are examined in Dare (1986).

In northern Britain extensive afforestation of moorlands with conifers has led to marked declines in Raven breeding success and numbers (Marquiss *et al.* 1978). For Snowdonia Ravens, Table 4 summarizes the performance of eight of nine pairs where closed canopy forest covered more than 30 per cent of the land within 1.5 km of their nests; seven nests are in one forest district. All nests were located on the peripheries of conifer blocks which, as in central Wales, contained enclaves of sheep pastures as well as abutting onto open sheepwalk or farmland. Observations were fragmentary and were complicated by extraneous factors causing some losses. Nonetheless, clearly some pairs (B,C) bred successfully, though not necessarily every year, with up to 51–60 per cent of closed forest around their nests. Only one pair (A) tried to breed within 71–80 per cent forest cover. This was a new pair which attempted for two years to fit into the 3.5 km gap between the nests of pair E and another pair outside the forest. Its first nest failed around hatching time. In the next year, this pair was present but appeared not to breed at all; its nest was then dismantled for nest material by Jackdaws *C. monedula*.

Ravens nesting on vegetated crags in conifer forests were vulnerable to fires. In mid-May 1980, a forest fire destroyed one nest, and probably its brood, and came within one metre above and downwind of a second nest on a heathery crag. Remarkably, the latter brood survived the heat and smoke, and was not deserted.

Dispersal of Young

In the immediate post-fledging period, families foraged noisily for a week or more in the vicinity of the nest, then moved away and often became elusive. Families appeared to stay as units through early summer, and to wander more widely over the high tops and secluded moors. There are 47 recoveries of Raven pulli ringed in (9) or near (38) the study area before 1976 (Fig. 2). Eight juveniles were found locally during the June–August after fledging; six had moved less than 9 km, but one had gone 20 km by July and another 25 km by August.

Most recoveries were on lowland Anglesey or eastwards of the study area (Fig. 2) in more populous districts where Ravens are more actively persecuted. After the first year, 12 of 24 recoveries occurred in April–May coincident with both the lambing season and the Raven nestling period; at least five of these birds had been shot. The median and maximum distances moved by 42 birds within north Wales were 19 km and 67 km; the median for all 47 birds was only 23 km (Dare 1986). However, three Ravens emigrated eastwards into England (40–122 km), one crossed the Irish Sea (178 km north-west) and another had flown 317 km up to south-east Scotland. The two birds which moved 94 km and 317 km were siblings, and both were just two years old at death. Immigration to the region also occurred: four birds ringed up to 185 km away in central and south-west Wales.

Discussion

The Raven population of Snowdonia has increased by around 80 per cent since the 1950s (Dare 1986), probably due to increasing sheep stocks (and carrion supplies) coupled with an abundance of rock nest sites and minimal persecution. By contrast, on the moors and farms of Migneint-Hiraethog, where persecution is more prevalent, Raven numbers have remained stable since the 1950s. Population density there appears to have been limited mainly by scarcity of secure tree nest sites.

Ravens can utilize a wide range of nest sites and habitats, and do not necessarily shun human presence, thus enabling them to breed in most types of terrain, though the highest levels in Snowdonia are avoided. The many structurally suitable crags above 700 m were not used, presumably because – as Ratcliffe (1962) surmised – of the more severe snow and ice conditions usually prevailing in January and February when Ravens build their nests. Snow cover is frequent above 450 m in Snowdonia from December through March, and is often prolonged above 650 m. The preferred types of nest crag and heights of nests above ground agreed also with Ratcliffe (1962).

Study area Ravens bred at nearly the same time (Table 3) as those in central Wales, where the season is related to maximum availability of sheep carrion (Newton *et al.* 1982). Overall breeding success was similar to that reported earlier in Snowdonia and recently in central Wales (Dare 1986). Afforestation, especially of some Snowdonia sheepwalks, has had little noticeable impact so far upon Raven breeding performance, numbers or distribution in the study area. This agrees with the findings of Newton *et al.* (1982) in central Wales but contrasts with reports from the Scottish border uplands (Marquiss *et al.* 1978) perhaps because Welsh conifer forests are smaller, more fragmented, still retain enclaves of sheep grazing, and adjoin open land.

Young Ravens reared in north Wales disperse widely, as judged by ringing recoveries, and there is immigration from further south. In central Wales, juveniles disperse probably at random and few return to their natal areas (Davis & Davis 1986). Holyoak (1971) analysed 147 British recoveries and found that young Ravens appeared to disperse soon after independence, with more than half moving over 30 km from their birth-places by the first winter. The general pattern among Welsh Ravens, therefore, is that, whereas

breeding adults are sedentary and territorial, their offspring scatter widely. This behaviour should lead to considerable interchanges between Raven populations in the different regions of Wales and, perhaps, maintain local populations which experience very poor breeding success due to persecution or other factors.

Summary

Ravens breeding in the mountains of Snowdonia are predominantly adaptable rock nesters, and experience little persecution or disturbance, whereas Ravens nesting in an adjoining region of farms and moors nest mainly in trees and suffer more persecution from sheep farmers. The breeding season extends from late February until late May or early June; timing and breeding performance are similar to that of Ravens in central Wales. Breeding was not obviously impaired by large-scale afforestation, apparently because the new conifer forests are too fragmented to reduce foraging areas significantly. Young Ravens reared in north Wales dispersed widely, and there may be considerable interchange between different populations in Wales.

Acknowledgements

I am particularly grateful to the late E. K. Allin, to whom this paper is dedicated, and to Dr D. A. Ratcliffe for providing historic nest site data and for their encouragement. E. K. Allin was also responsible for most of the ringing of Raven pulli in north Wales during the last 25 years. Special thanks are due to the following observers for their assistance in locating nests: B. Boothroyd, J. Driver, G. Jones-Ellis, G. Parry, and G. Roberts; while information was received also from: J. C. Barnes, R. H. Fisher, W. I. Jones, L. Taylor and G. A. Williams. I thank Mrs Jane Marchant for extracting recovery data from the British Trust for Ornithology computer and the B.T.O. for permission to use these data. Finally, many farmers allowed me unlimited access to their lands.

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BOOK REVIEWS

Garden and Grove. The Italian Renaissance Garden in the English Imagination: 1600–1750 by **John Dixon Hunt.** Pp. xx + 268, including 113 figures.

Gardens for most people are expected to be places of colour and relaxation. *Garden and Grove*, as a book about gardens, is not relaxing and whilst it is meticulously compiled, the use of black and white only for its many illustrations deprives it of any sense of colour. It is nevertheless a very skilfully produced volume which deserves the attention of enthusiasts.

In essence, the book is an account of early seventeenth to middle eighteenth century

formal and sculptured gardens; the first section deals with several famous gardens, mostly in central and northern Italy, including such well known names as the Valmanana Gardens in Vincenza, Villa Aldobrandini Gardens at Frascati, Borghese Gardens in Rome, Garden of the Villa d'Este at Tivoli, Gardens of Isola Bella on Lake Maggiore and many more. There seems to have been much skill and imagination in creating elaborate scenes, with water rushing down over specially placed stones and rock formations so as to cause extraordinary musical and birdsong effects. In some instances the force of water set in motion a storm effect, imitating rain, hail, snow and thunder which could be heard for miles. Later, the book goes on to describe the Boboli Gardens in Florence and the famous Grotto.

There is a very detailed account of the formal style of the seventeenth century Italian garden which became popular in France and Holland and was later taken up with some enthusiasm in England. A major section follows which concentrates on English gardens, particularly those in the counties of Sussex, Surrey and north to Derbyshire with Chatsworth especially in mind. The author concludes that as the English climate differs so much from that of Italy, gardens in this country later became more organized with gravel paths and shrubbery.

Garden and Grove, particularly the first part where Italian gardens are described in such an extremely detailed manner, is full of involved and sometimes obscure quotations and although most of these are identified in notes at the end of the book, it rather makes for very concentrated reading. This is obviously a book for students of international garden history and landscape architecture, written by a very knowledgeable specialist, which will appeal to kindred specialists.

MET

The Botanists: a history of the Botanical Society of the British Isles through a hundred and fifty years by **David Elliston Allen**. Pp. xvi + 232, including numerous line drawings and b/w photographs. St Paul's Bibliographies, Winchester. 1986. £15.00 (post-free in UK if cheque accompanies order from: West End House, 1 Step Terrace, Winchester, Hampshire SO22 5BW).

Despite its chequered history, the Botanical Society of the British Isles has stamped its authority on British botany. From the outset, one of its great strengths has been that it has always drawn its enthusiastic and knowledgeable membership from a broad spectrum of amateurs and professionals. David Allen, one of the world's foremost botanical historians, is the ideal person to blend together, in a manner both colourful and scholarly, the various strands of the BSBI's history. He portrays not only the physical and social conditions which hampered or promoted the Society's growth, but also paints a vivid picture of the very different personalities involved, some of whom, by their domination, greatly influenced its direction.

The Botanists traces the origins of botanical societies in the seventeenth and eighteenth centuries, precursors of the BSBI, and follows this with a study of the Society's achievements over the past 150 years, highlighting more recent developments and exploring future prospects. However, notwithstanding the book's subtitle, David Allen has chosen to close his historical account at about 1965.

The author has critically analysed archival and published sources, paying particular attention to the composition of the memberships of early botanical groups and societies; his detailed appendix, for example, dealing with the membership of the Botanical Society of London, sheds considerable light on the varied professional knowledge and talents, etc. of the members, information which will prove of considerable value to future botanical biographers.

The text is interspersed with figures and plates, including many delightful portraits, some published for the first time.

The Botanists is a scholarly and readable work: those interested in the past, present and future of British botany will find it both informative and enjoyable.

MRDS

TWO INTERESTING BRITISH LICHENS: *ACAROSPORA UMBILICATA* BAGL., NEW TO YORKSHIRE, AND *POLYSPORINA DUBIA* (H. MAGN.) VEŽDA, NEW TO ENGLAND

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During an intensive study in November, 1984, of lichens on a stretch of Millstone Grit roadside wall just outside Otley, Yorkshire, several colonies of a squamulose-areolate lichen were encountered, much of the plant liberally encrusted with white pruina (Fig. 1). Some squamules bore immersed to plane fruits which, under the microscope, proved to have asci containing numerous tiny spores, suggestive of the genus *Acarospora*. On examination of a specimen despatched to the British Museum (Natural History) and comparison with material in the Herbarium there, Mr J. R. Laundon identified the plant as *Acarospora umbilicata*.

FIGURE 1
Herbarium specimen (× 4) of *Acarospora umbilicata* (Otley colony 1: see Table 1). Photograph by D. J. S. Bailey.

The British material of *A. umbilicata* in BM is in two packets collected from the same locality by William Watson. Particulars on both packets read: Arenareous rock on the borders of Gloucestershire, near Ross. Aug. 1925. W. Watson; the material is determined by Dr Magnusson. Watson (1953) gives also a dubious record of *A. umbilicata* from VC 60, but no substantiating material is known.

In August 1985, Dr C. J. B. Hitch visited the Otley locality with the author. Later in

that month he discovered a sparse colony of *A. umbilicata* on the church wall at Tenandry, near Pitlochry, Scotland. Specimens of this and of two of his Suffolk collections of similar appearance were sent to Dr C. Roux in France, who confirmed them as *A. umbilicata*.

In April 1986, during a lichenological inspection of the church hall at Sinnington, North Yorkshire, four colonies were found at the base of the windows, two on the south and two on the west face. Among the immediate associates of one of the thalli on the south face was what was at first taken to be a black-fruited *Acarospora* with umbonate-wrinkled ascocarps. A collection of this plant was despatched to Dr B. J. Coppins of the Royal Botanic Garden, Edinburgh. His examination showed it to be *Polysporina dubia*, a lichen previously known in Britain only from one locality in Wales, where Dr Coppins found it in 1984. *P. dubia* is one of the few lichens parasitizing other lichens and is usually found invading *Acarospora* species (Wirth 1980, as *Sarcogyne dubia*). At Sinnington it inhabits the squamules of an indeterminate *Acarospora* which does not appear (thallus C−) to be *A. fuscata*, although this species occurs as an associate there.

The latest record of *A. umbilicata* is from Bilton, near Harrogate, where it is growing on the low flat Millstone Grit coping of a roadside wall. No other colonies were found in the vicinity.

The British records of *A. umbilicata* and *P. dubia* can thus be chronologically summarized as follows:

A. umbilicata Bagl.

1. VC 36, Herefordshire, Ross, 32/52, on arenaceous rock, August 1925, W. Watson (BM).
2. VC 25, Suffolk, Creeting St. Mary, 62/0956, on brick coping of churchyard wall, 26 August 1981, C. J. B. Hitch (Herb. Hitch).
3. VC 64, West Yorkshire, Otley, 44/2044, on Millstone Grit roadside wall under coping, October 1984, A. Henderson (LDS).
4. VC 88, Perthshire, near Pitlochry, Tenandry, 27/9161, on crumbling ferrugineous mica schist of north wall of church by road, 13 August 1985, C. J. B. Hitch (Herb. Hitch).
5. VC 26, Suffolk, Long Melford, 52/8646, on sloping red brick of church wall, 3 November 1985, C. J. B. Hitch (Herb. Hitch).
6. VC 62, North Yorkshire, Sinnington, 44/745858, on outward sloping sandstone sills of church hall, April 1986, A. Henderson (LDS).
7. VC 64, North Yorkshire, near Harrogate, Bilton, 44/315577, on Millstone Grit coping of roadside wall, 26 July 1986, A. Henderson (LDS).

Polysporina dubia (H. Magn.) Vežda

1. VC 42, Brecon, Abergwesyn, Nant Irfon, 22/840550, rocks by Afon Irfon at Camddwr Bleiddiad, on smooth surface of siliceous rocks by river, *c*1000 ft, 6 August 1984, B.J. Coppins & R. G. Woods (E).
2. VC 62, North Yorkshire, Sinnington, 44/745858, on *Acarospora* sp, on outward sloping sill of church hall, April 1986, A. Henderson (E).

A notable feature of the community lists (Table 1) is the considerable calcareous influence exerted in the siliceous habitats examined (with the possible exception of Bilton), an influence shown by the presence of such calcicolously inclined species as *Caloplaca citrina*, *Candelariella aurella*, *Catillaria lenticularis* and *Lecanora dispersa* and of mortar (often old and crumbling) in salient positions nearby for leaching of the sites; the oolitic limestone of the building is also a contributory factor at Sinnington. This calcareous influence is important in the light of the examination, described below, of the pruina of *A. umbilicata*.

The whitish, firmly adherent pruina which invests *A. umbilicata* to a greater or lesser degree is the feature most easily distinguishing it from *A. fuscata* (Clauzade *et al* 1981), to which squamules of *A. umbilicata* lacking pruina bear strong resemblance. Under scanning electron microscope examination of the pruina, it was only at higher powers (500+) that more or less well-shaped crystals became apparent (Fig. 2). X-ray diffraction analysis showed well defined lines denoting the presence of calcium oxalate in the form of

whewellite (Fig. 3). Other strong lines in the photograph showed the presence of silicon dioxide (quartz), a considerable degree of spottiness of these lines suggesting that some of these crystals were comparatively large and might well be substrate particles either attached to or immersed in the thallus which had escaped removal in the manual separating process prior to X-ray diffraction. Clauzade *et al.* (1981) describe *A. umbilicata* as a calcifuge, and as none of the British substrates examined gave the least trace of effervescence with hydrochloric acid, a sample of substrate from beneath the thallus of *A.*

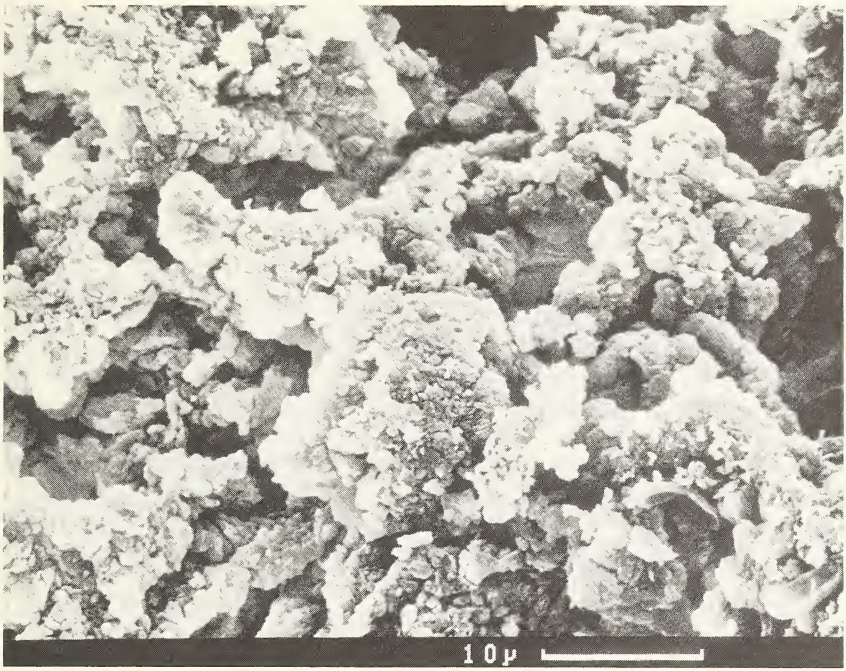

FIGURE 2
Scanning electron micrograph of the pruina of *Acarospora umbilicata* (Otley colony 1: see Fig. 1). Photograph by A. Hicks.

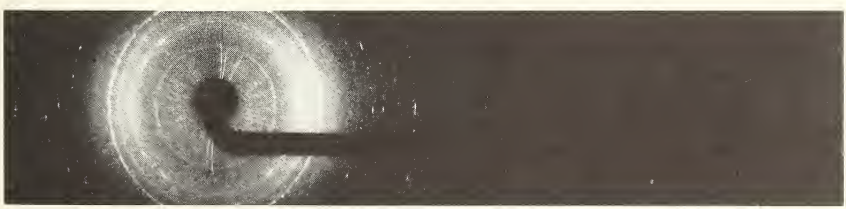

FIGURE 3
X-ray powder photograph of pruina separated from the thallus of *Acarospora umbilicata* (Otley colony 1: see Fig. 1 and 2). Camera radius = 28.65 mm, λ = 1.5418 Å (CuKα radiation, Ni filtered). First and third lines from centre correspond to d spacings of 3.69 and 3.00 Å respectively, characteristic of whewellite. The second and fourth rings (and other lines) are produced by silica. Photograph by Dr B. Sheldrick.

TABLE 1
Lichen communities at 9 Yorkshire localities of *A. umbilicata*

	Otley (7 colonies)							Bilton	Sinnington
	1	2	3	4	5	6	7		
Acarospora umbilicata	+	+	+	+	+	+	+	+	+
Buellia punctata									+
Caloplaca citrina	+								+
Candelariella aurella	+	+	+	+	+	+	+		
C. vitellina								+	+
Catillaria lenticularis	+		+			+			
Lecanora dispersa	+	+	+	+	+	+	+	+	+
L. polytropa									+
L. soralifera									+
Lecidella scabra	+	+			+	+		+	
Phaeophyscia nigricans									+
Polysporina dubia									+
Trapelia placodioides					+				
Verrucaria muralis	+		+						
V. viridula f. tectorum								+	

Key: + = Species present
NB: Other species occurring as non-immediate associates at one or more localities are: *Acarospora fuscata, Lecanora muralis, Micarea lignaria, Protoblastenia rupestris, Trapelia coarctata, T. obtegens* and *Scoliciosporum umbrinum*.

TABLE 2
Chemical analysis of substrate underneath *Acarospora umbilicata* (Otley colony 1)

	%		%
SiO_2	82.00	CaO	0.13
TiO_2	0.24	Na_2O	1.60
Al_2O_3	7.82	K_2O	1.68
Fe_2O_3	1.56	P_2O_5	0.04
MnO	0.06		95.13

umbilicata (Otley colony 1) was submitted to analysis, in order to ascertain its calcium content. Table 2 shows the result of this analysis. Although substrate calcium is not high, it should be amply available to the lichen. In this connection, it may be noted that Vidrich *et al* (1982) found calcium oxalate in unidentified lichens on each of a variety of rock types they looked at (sandstone, limestone, altered greenstone and serpentinite). Clearly, too, as implied above, mortar run-off could constitute a further important source of calcium. At all but two of the British sites mortar is evident in the immediate vicinity and *A. umbilicata* is well placed to receive downward leaching in rain, etc, often appearing to favour outward sloping faces under crumbling or eroding mortar. One exception is the Bilton locality, but even here there is the possibility of rainsplash or flooding from niche mortar.

Of several functions suggested for calcium oxalate in plants (Franceschi *et al.* 1980), Wadsten *et al.* (1985) believe the main reason for the surface calcium oxalate crystals formed by some lichens may well be the disposal of excess calcium. Such crystals might also serve (Foster 1956) as a means of isolating excess and possibly toxic oxalate. An

anti-desiccant role has also been proposed. The ability of calcium oxalate crystals to reduce or prevent evaporation was pointed out by Zukal (1886; see also Smith 1921 p. 215). Such a role seems most likely in the case of the pruina on *A. umbilicata*. Whewellite (the monohydrate crystal form of calcium oxalate detected) does not have zeolitic water and therefore cannot make water available to the lichen, as was suggested (Wadsten *et al.* 1985) in the case of weddellite (dihydrate form) which has zeolitic water. However, the overall structure of the pruina with its many interstices could be regarded as effectively deepening the protective surface microclimate (including the boundary layer proper) immediately above the thallus, rendering it less vulnerable to sudden drying out and drought stress.

Calcium oxalate in lichens is known to be associated with the secretion of oxalic acid by the mycobiont (see e.g. Jones *et al.* 1980), and oxalic acid is one of the agents by which lichen hyphae are enabled to dissolve and etch rock minerals and penetrate stone substrates. Such biochemical weathering activity is highly probable in the case of *A. umbilicata*.

In many plants calcium oxalate crystals play another major role i.e. the provision of anti-herbivore protection. Oxalic acid is, indeed, noted (Kingsbury 1964) as the only plant organic acid toxic to livestock under natural conditions. However, in experiments with lichens, Stahl (1904; see also Gerson & Seaward 1977) found that the presence of calcium oxalate did not deter predation by small animals, although that of some lichen acids did.

The British records of *A. umbilicata* suggest it is most probably overlooked, and is likely to occur, even if infrequently, throughout most of eastern England. From the records to date it should most be sought on (outward sloping) patches of sandstone or brick faces subject to mortar run-off or other calcareous leaching. At two of the three Yorkshire sites, exploration close by quickly revealed further colonies in the immediate vicinity.

Records of *P. dubia* are too few for any conclusion to be drawn except the need for diligent field examination of *Acarospora* thalli.

Acknowledgements

I am most grateful to Dr C. Roux, Dr B. J. Coppins and Mr J. R. Laundon for the determination of critical material; to Dr S. C. Clark, Dr O. L. Gilbert and Dr C. J. B. Hitch for informative and helpful discussions; to Dr B. Sheldrick for X-ray diffraction analysis and to Dr G. Hornung for chemical analysis; to Mr A. Hicks for scanning electron microscopy, and to him and Mr D. J. S. Bailey for photography.

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NOTE

Since this article was accepted for publication, Dr B. J. Coppins has written informing me that he has found *Polysporina dubia* in a Scottish locality. Details of this most recent record are: VC 85, Fife, 7 km north of Dunfermline, Blairadam, Craigencat Craigs, 36/102952, on south-facing basaltic crags, partly parasitic on *Acarospora sinopica*, 900 ft, 26 October 1986. B. J. Coppins (E).

BOOK REVIEWS

Butterflies and Late Loves: the Further Travels and Adventures of a Victorian Lady by **Margaret Fountaine**. Edited by W. F. Cater. Pp. 141 + b/w photographic frontispiece. Collins. 1986. £9.95.

Those who enjoyed *Love Among the Butterflies* published in 1980 (see *Naturalist* **106**: 86-87) will no doubt want to read this further selection from the extensive series of diaries (1878–1939) bequeathed by Margaret Fountaine to the Castle Museum, Norwich. However, lepidopterists should not expect too much: the sub-title says it all.

Ireland by **W. A. Poucher**. Pp. 205, illustrated throughout in full colour. Constable. 1986. £12.95.

Many readers will already be familiar with one or more of W. A. Poucher's photographic records of wild and beautiful areas of Britain. Here he turns his camera on the lovely landscape of rural Ireland, especially its mountainous areas, the 97 colour plates being arranged in the form of a circular tour of the country which visitors can follow. The photography is quite superb and will delight all those who have toured the Emerald Isle, and will tempt those unfamiliar with it to do so.

The European Garden Flora. A manual for the identification of plants cultivated in Europe, both out-of-doors and under glass. Volume I. Pteridophyta, Gymnospermae, Angiospermae – Monocotyledons (Part I). Edited by **S. M. Walters, A. Brady, C. D. Brickell, J. Cullen, P. S. Green, J. Lewis, V. A. Matthews, D. A. Webb, P. F. Yeo** and **J. C. M. Alexander**. Pp. xvi + 430, including 44 figures. Cambridge University Press. 1986. £55.00.

This is a comprehensive scientific guide for the identification of plants cultivated for amenity in Europe, which does not include horticultural or agricultural crops, or garden weeds. Sufficient synonymy is provided to cross-reference to the commonest names under which plants may be encountered in books and catalogues old and new. The flora meets the needs of both the informed amateur gardener and the professional plant taxonomist.

The editors and publishers are to be warmly commended for the high standard of production: the clarity and layout of the type, especially the keys, the excellent line drawings, glossary and index are singled out for particular praise. Obviously, only a small proportion of the taxa described can be supported here by line drawings, so that the references to illustration sources elsewhere are an especially helpful feature.

This magnificent project will be a quite indispensable reference work when complete – forthcoming volumes are eagerly awaited.

MRDS

THE HORNET, *VESPA CRABRO*, CONFIRMED NESTING IN YORKSHIRE

MICHAEL E. ARCHER

The short paper by Archer (1986) summarizing observations of the hornet in Yorkshire has stimulated much interest, and a further three records, including the first nesting record, have been reported. The sixth record is of an active nest found during the period end of July until the beginning of August 1985 by Mr G. Howe at Penistone (VC 63, SE 2403); Mr J. H. Flint has confirmed this record. The seventh record is of a dead queen found on a windowsill in early June by Mr D. E. Yates at Doncaster (VC 63, SK 5699); Mr P. Skidmore has confirmed this record. Circumstantial evidence suggests this specimen

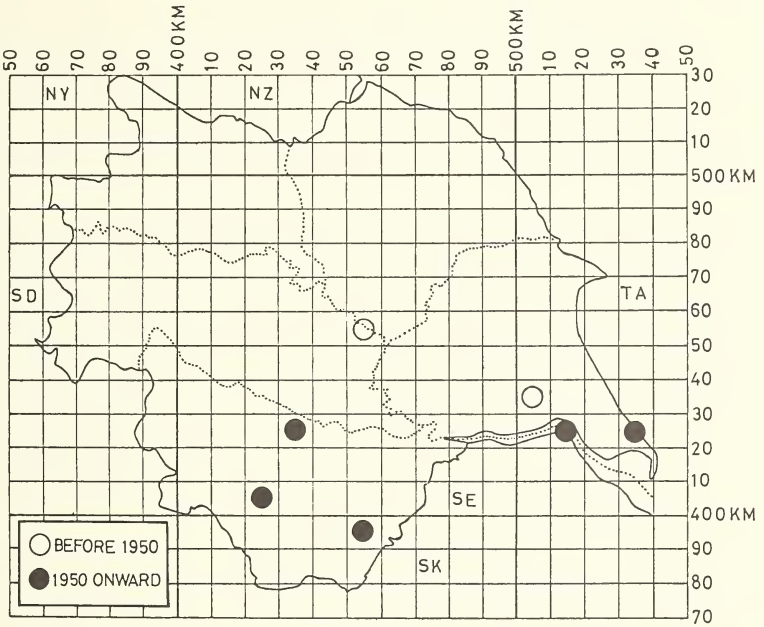

FIGURE 1
Records of the hornet, *Vespa crabro*, in Yorkshire.

had over-wintered in the house and was trapped when attempting to leave on its late spring flight. The eighth record is of a living queen captured in the Weldon Woods area (VC 61, TA 318249) in a beehive on 15 June 1986. The specimen was sent to me by Mrs H. M. Frost so I was able to carry out the confirmation. The fifth record, also of a queen sent to me by Mrs Frost, has now been deposited in Keighley Museum.

These new records represent the continuing northward spread of the hornet and show that the hornet has now reached VC 61 and VC 63 and that breeding colonies have been established (Fig. 1). I have had the good fortune to observe a colony this year (1986) nesting in the hollow trunk of a dead tree at Sherwood Park, Nottinghamshire (VC 56, SK 6268).

Archer M. E. (1986). A queen hornet, *Vespa crabro*, taken near Hull. *Bull. Yorkshire Nat. Union*. **3**: 5–6. October 1986.

FIELD NOTE

Notable insects at Caydale (North Yorkshire)

The published reports of YNU excursions in 1984 include a brief note on the entomology of Caydale (VC 62) which was visited on 24 June (*Naturalist* **110**: 74). This present note is based upon lists of insects received subsequently and should be read in conjunction with the report referred to.

Messrs M. L. Denton and R. J. Marsh have individually produced useful lists of beetles for the valley, notable additional records to those already published (l.c.) being the weevil *Gymnetron pascuorum* (Gyll.), the ground beetle *Trechus secalis* (Pk.) and the moorland species *Pterostichus adstrictus* Esch. reported by Mike Denton, who also records the water beetle *Platambus maculatus* (L.), a typical species of running water, and the leaf beetle *Bruchus loti* Pk. which is associated with vetches. Amongst the beetles reported by Bob Marsh are the ground beetle *Stomis pumicatus* (Panz.), the rove beetle *Quedius nitipennis* (Steph.), and the tiny *Pselaphus heisei* (Herbst) from wet moss under a small waterfall. The soldier beetles *Malthodes fuscus* (Waltl) and *M. fibulatus* Kies. were collected by general sweeping, and the tiny fungus beetle *Litargus connexus* (Fourc.) was found under the bark of a fallen tree. Finally, Mr Marsh reports the beautiful green beetle *Oedemera virescens* (L.) which, like *Ischnomera sanguinicollis* previously noted, is one of the very local species to be found in wooded valleys of the general area in which Caydale is situated.

Of particular note was the small reddish weevil *Anthonomus bituberculatus* Thoms. of which Mr R. Crossley found a single specimen. This hawthorn species has possibly been confused in the past with the closely allied *A. ulmi* (Deg.) and attention was drawn to this in a paper (Morris, M. G., 1977, The British species of *Anthonomus* Germar (Col., Curculionidae), *Entomologist's mon. Mag.* **112**: 19–40). This constitutes the first record of the species for Yorkshire, although other specimens may be present in collections under the name *A. ulmi*.

Mr K. G. Payne reports four species of caddis flies, *Odontocerum albicorne* (Scop.), (coll. R.C.), *Sericostoma personatum* (Spence), *Tinodes dives* (Pictet) and *Agapetus fuscipes* Curtis. All are species typical of fairly fast flowing streams. Kenneth Payne also records three species of crane flies, *Tipula lateralis* Mg., *T. vernalis* Mg., and *T. pruinosa* Wied., commenting that the first two are often plentiful in a range of wet habitats, whilst the third is frequent but rather local in Yorkshire.

Flies of the families Empididae and Dolichopodidae were collected by Roy Crossley who identified 14 empid species and 13 dolichopodids. Most are common and widespread but of note are the dolichopodids *Hypophyllus crinipes* (Staeg.) which also occurs nearby at Ashberry, and *Hercostomus celer* (Mg.) which is a rather local species.

I am obliged to Messrs Denton, Marsh and Payne for species lists and to Mr J. H. Flint, YNU recorder for Coleoptera, for helpful comments on the beetles reported.

ROY CROSSLEY

CHINESE MITTEN CRABS

A second record of the Chinese Mitten Crab, *Eriocheir sinensis* Milne-Edwards, in Yorkshire is reported. It was collected from the River Ouse at Cawood by eel netsman Mr Tom Hunt. The crab is female and has a carapace width of *c*.7 cm and a leg span of *c*.22 cm. This follows the collection of specimens from the River Thames in 1976 and recently from the River Ancholme, Lincolnshire (Clark, P., 1984, Recent records of Alien Crabs in Britain, *Naturalist* **109**: 111–112).

Any further findings of this crab in Yorkshire should be reported and specimens sent to the Biology Section, Yorkshire Water, North & East Division, 32–34 Monkgate, York YO3 7RH, who will forward the reports to the National Recorders.

BOTANICAL RECORDS MADE BY WILLIAM GAWTHORP OF RIPLEY NEAR HARROGATE IN THE EIGHTEENTH CENTURY

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In a letter to the Editor of *The Naturalist* (1983, **108**; 164), the Keeper of Botany of the Merseyside County Museums drew attention to a copy in their possession of John Wilson's book *A Synopsis of British Plants in Mr. Ray's Method* (1744) which originally belonged to William Gawthorp of Ripley and contained numerous annotations by him from 1746 onwards giving the exact localities for many of the plants he observed. Ripley lies in the middle of the area of study of the Harrogate and District Naturalists' Society, who two centuries later published in 1978 a *Botanical Atlas of the Harrogate District* on a 1 km square basis. The Keeper kindly lent the book to the Society, and it is hoped that this comparison of Gawthorp's records with those of the present day may be of value to those interested in the flora of Yorkshire.

Who were Ray, Wilson and Gawthorp? In the preface to his admirable biography of John Ray, Professor Charles Raven described how to him 'it became clear that the change from the old world of superstition, the world in which there was no settled frame of reference except that fashioned by deduction from the Bible and Aristotle, the world of alchemy and magic, took place not in the eighteenth century but in the seventeenth; that the transition was made by the simultaneous labours of the "new philosophers" in Italy, France, Holland and Britain; and that in the realm of biology, or at least of botany and zoology, there was one man of outstanding genius, "our countryman, the excellent Mr. Ray"'. John Ray (1627–1705) contributed greatly to the classification of plants, using a wider basis of structure and natural affinities than Linnaeus, who fastened on a single character, the sexual structure of the flower, and in 1682 published his *Methodus Plantarum*. His work on the flora of Britain reached its climax in his *Synopsis methodica stirpium Britannicarum* (1690).

John Wilson (1696–1751) was a shoemaker and baker of Kendal. His *A Synopsis of British Plants in Mr. Ray's Method* was written in English and published in Newcastle upon Tyne in 1744. In naming plants Wilson often refers to Ray's *Synopsis*, of which the third edition was published in 1724 after Ray's death, and also to earlier authors such as Gerard, Parkinson and Caspar Bauhin. On the title page of his copy of Wilson's book is written 'William Gawthorp's of Ripley 1746'. Gawthorp may have known Wilson as they were both natives of Westmorland. According to the Parish Register, Gawthorp was Rector of Ripley from 1736 till his death and burial in the churchyard there in 1759. Six annotations are dated, i.e. one just before Gawthorp's death in 1759, 1770, 1771 (2), 1772 and 1773. Perhaps one of Gawthorp's family or a friend continued recording in the book after his death. He is not included in Desmond's edition of the *Biographical Index of British and Irish Botanists and Horticulturists*. He refers to Mr. H. W. Sharp, Mr. Barker, and Dr. Thornbeck who gave him *Calceolus Mariae* (the Lady's Slipper). His handwriting was good on the whole, though some of the words are difficult to decipher and some are abbreviated because of lack of space. One or two of the identifications seem improbable, but I have not excluded any.

Gawthorp made about 500 annotations in the book to mark which species he had found and where. In studying these the first step in many cases was to find the modern binomial names of plants corresponding to the pre-Linnaean polynomials used by Wilson. Ewen and Prime in their translation of Ray's *Flora of Cambridgeshire* give the equivalents of many of Ray's names of plants. Dr. W. A. Sledge has kindly helped me with the names of other species, using Sir James Edward Smith's *Flora Britannica* (1800–1804) wherein pre-Linnaean polynomials are cited for all species. Gawthorp's records have been studied on a geographical basis by listing the localities he named, and the species he found there.

In the following study I have asterisked the names of species in localities within the H.D.N.S. study area which according to the *Botanical Atlas* are no longer to be found in those localities. When Gawthorp started recording he would first have noted the common plants near his home, so the locality with the highest number of species, totalling over 160, is the vicinity of Ripley. Sometimes he is precise about the place, e.g. *Linaria vulgaris* (Common Toadflax) 'in Mr. Bayne's Pasture, Ripley' or *Hypericum pulchrum* (Slender St. John's wort) 'in Sir John's walk by Whiply Lane'. Some notable species there were *Scabiosa columbaria* (Small Scabious)*, *Turritis glabra* (Tower Mustard)*, *Melilotis altissima* (Tall Melilot)* and *Allium vineale* (Crow Garlic)* ('in Church Pasture too plentif.'). Some localities must have been wetland: for instance Ash Wells, Ripley had *Menyanthes trifoliata* (Bogbean)*, *Epipactis palustris* (Marsh Helleborine)*, *Pinguicula vulgaris* (Common Butterwort)*, *Primula farinosa* (Bird's eye Primrose)*, *Trollius europaeus* (Globe Flower)* and *Paris quadrifolia* (Herb Paris)*. 'Jn. Proctor's Pasture' in the same area held *Senecio erucifolius* (Hoary Ragwort)*, *Baldellia ranunculoides* (Lesser Water-plantain)*, *Gentianella amarella* (Autumn Gentian)* and *Sagina nodosa* (Knotted Pearlwort)*. In nearby 'Duke [i.e. Marmaduke] Hardcastle's Pasture' grew *Utricularia vulgaris* and *U. minor* (Greater and Lesser Bladderwort)*, and *Drosera rotundifolia* and *D. intermedia* (Round-leaved and Oblong-leaved Sundew)*. 'In the Stanks' Gawthorp found *Parnassia palustris* (Grass of Parnassus)*. Ripley Lime Kiln contained *Blackstonia perfoliata* (Yellowwort)* with *Ophrys insectifera* (Fly Orchid)*. 'Old Nyd, Ripley' had *Bidens cernua* (Nodding Bur-marigold), *Alisma plantago-aquatica* (Common Water-plantain) and *Epipactis palustris**. In Sawcroft Brow were found *Lathraea squamaria* (Toothwort)* and *Neottia nidus-avis* (Bird's nest Orchid)*. *Platanthera chlorantha* and *P. bifolia* (Butterfly Orchid and Lesser Butterfly-orchid)* grew in pastures round Holly Bank Wood. Gawthorp noticed *Botrychium lunaria* (Moonwort)* in Toft Riggs Pasture, in Mr. Coates Pasture, and at High Rails. 'Sir Jno.'s Mount' had *Epipactis helleborine* (Broad-leaved Helleborine)*, 'Old Star Pasture' contained *Hottonia palustris* (Water Violet)*, while *Anagallis tenella* (Bog Pimpernel)* was found in 'Geo. Wilson's black bog'.

Near Ripley on Scaro Moor grew *Hypericum elodes* (Marsh St. John's wort)* and at Kettlespring *Rhinanthus serotinus* (Greater Yellow Rattle)*. Just to the east in Newton Wath Lane was *Calamintha nepeta* (Lesser Calamint)*, at Newton Wath *Sium latifolium* (Greater Water-parsnip)*, and at Newton Hall *Artemisia absinthium* (Wormwood)*. To the south of Ripley *Chrysanthemum vulgare* (Tansy)* was found above Killinghall bridge, *Mentha pulegium* (Pennyroyal)* at Killinghall near J. Broadbelt's, *Nepeta cataria* (Catmint)* at the 'Low end of Killinghall', and *Hypericum elodes** on a bog near Killinghall. At Harrogate Gawthorp recorded *Antennaria dioica* (Mountain Everlasting)* 'on Harrogate Knocks', *Scutellaria minor* (Lesser Skullcap)* on 'Harrogate Moor nr great Crag below Turnpike ovr Knox', *Apium inundatum* (Lesser Marshwort)* 'in the mill race above Turnpike Road Knox', and *Osmunda regalis* (Royal Fern)* on Hewkstone (possibly Hookstone) Cragg. *Ophioglossum vulgatum* (Adder's Tongue)* grew 'in Foolish Close below Bilton Hall'. At Spofforth *Asplenium adiantum-nigrum* (Black Spleenwort) was found on Spofforth Manor Walls, and *Lemna polyrhiza* (Great Duckweed)* in Spofforth dam head.

To the east of Ripley Gawthorp recorded *Osmunda regalis** at Susakers 'in a pond near the Houses', *Serratula tinctoria* (Saw-wort) at 'South Side next Breerton Moor', *Samolus valerandi* (Brookweed) on 'Brierton Moor, under Susacres Inclosures plentifully in a Carr', *Primula farinosa** at Susacres, and *Nepeta cataria** at 'Breerton' and *Filago germanica* (Common Cudweed)* in 'Scotton Stone quarry'. *Epipactis palustris** and *Echium vulgare* (Viper's Bugloss) grew at Walkingham Mill, and *Ranunculus lingua* (Greater Spearwort)* in Walkingham Mill Dam. Staveley and its Carr held many wetland plants. There Gawthorp found *Hippuris vulgaris* (Mare's-tail), *Potamogeton lucens* (Shining Pondweed)*, *P. natans* (Broad-leaved Pondweed), *P. perfoliatus* (Perfoliate Pondweed)*, *Groenlandia densa* (Opposite-leaved Pondweed), *Oenanthe aquatica* (Fine-leaved Water-dropwort)* and *O. fistulosa* (Tubular Water-dropwort)*, *Apium*

*inundatum** and *A. graveolens* (Wild Celery)*, *Samolus valerandi*, *Lythrum salicaria* (Purple Loosestrife), and *Nymphaea lutea* (Yellow Water-lily). Also found at Staveley were *Daucus carota* (Wild Carrot), *Thalictrum flavum* (Common Meadow Rue), *Lycopus europaeus* (Gipsywort), *Chamaenerion angustifolium* (Rose Bay) and *Sagina nodosa*. At 'Aldbro' grew *Onoperdon acanthium* (Scotch Thistle)*. Knaresborough, about 5 miles east of Ripley, stands on Magnesian limestone. Gawthorp found *Bidens tripartita* (Bur-Marigold)* 'on this side Knaresborough' and *Cystopteris fragilis* (Brittle Bladder-fern)* 'below Knaresborough high bridge'. He recorded *Parietaria diffusa* (Pellitory-of-the-wall), *Pulicaria dysenterica* (Common Fleabane)*, *Cynoglossum officinale* (Hound's Tongue)*, *Echium vulgare**, *Verbena officinalis* (Vervain)*, *Salvia horminoides* (Wild Clary)*, *Marrubium vulgare* (White Horehound)*, *Calamintha nepeta**, *Malva neglecta* (Dwarf Mallow)*, *Atropa belladonna* (Deadly Nightshade)*, *Paris quadrifolia**, *Aquilegia vulgaris* (Columbine)*, *Hyoscyamus niger* (Henbane)*, *Cheiranthus cheiri* (Wallflower), *Turritis glabra**, *Coronopus squamatus* (Swine-cress)*, *Melilotus altissima**, *Silene nutans* (Nottingham Catchfly)*, *Geranium sanguineum* (Bloody Crane's-bill)* and *Allium carinatum* (Keeled Garlic)*.

The band of Magnesian limestone extends north-westwards from Knaresborough, and Gawthorp evidently found a botanical happy hunting ground around Ripon, Staveley and Fountains Abbey. He found *Equisetum hyemale* (Dutch Rush)* at 'Laver Bank and Bishopton Alders near Ripon', *Rumex hydrolapathum* (Water Dock)* in a 'Ditch low side Rippon common', *Hottonia palustris** 'near Ripon in ditches common', *Misopates orontium* (Lesser Snapdragon)* on 'Red Bank nr. Ripon', *Butomus umbellatus* (Flowering Rush)* 'In a ditch east side of Ripon comn.', *Trifolium scabrum* (Rough Clover)* 'on Alcey Hill behind Ripon Minster Mr. B.', *Gagea lutea* (Yellow Star-of-Bethlehem) at 'Skell crooks near Ripon', *Neottia nidus-avis** at 'South scar and Laver Banks nr Ripon', while at Quarry Moor, Ripon grew *Ononis spinosa* (Spiny Restharrow)* and *Spiranthes spiralis* (Autumn Lady's-tresses)*.

In Studley Park Gawthorp recorded *Potentilla fruticosa* (Shrubby Cinquefoil)*, *Polygonatum multiflorum* (Solomon's seal)*, *Aquilegia vulgaris, Campanula glomerata* (Clustered Bellflower), and *Anacamptis pyramidalis* (Pyramidal Orchid)*. 'South Scar and Mackleshaw Studley Park' contained *Ophrys insectifera**, *O. apifera* (Bee Orchid)*, *Platanthera bifolia** and surprisingly *Cephalanthera rubra* (Red Helleborine)*. *Lathyrus aphaca* (Yellow Vetchling)* grew in Studley Field, *Equisetum hyemale** 'at low end of South Scar' and *Erigeron acer* (Blue Fleabane)* at 'South Scar nr. Studley'. *Thalictrum minus* (Lesser Meadow-rue) and *Convallaria maialis* (Lily-of-the-Valley)* were found in Mackleshaw.

At the 'low end of Fountains wood near Studley Park pales plentif.' was *Paris quadrifolia**, and 'out of the rocks above Fountains Abbey' grew *Helleborus foetidus* (Stinking Hellebore). Among Gawthorp's records for Fountains Abbey were *Asplenium viride* (Green Spleenwort)*, 'Dormitory, Fountains Abbey south end', *Lactuca virosa* (Greater Prickly Lettuce)*, *Parietaria diffusa, Erigeron acer, Dipsacus pilosus* (Small Teasel), *Smyrnium olusatrum* (Alexanders)*, *Actaea spicata* (Baneberry)* 'below Fountains Mill', *Atropa belladonna, Aquilegia vulgaris, Lathraea squamaria* 'in Kitching bank', *Turritis glabra**, *Meconopsis cambrica* (Welsh Poppy)* and *Polygonatum multiflorum**. The Common Pink he found was presumably *Dianthus plumarius*, not *D. caryophyllus* which seems to be the equivalent name to his. 'In the pasture above Fountains' grew *Botrychium lunaria**, and in the 'Lane going from Fountains Hall to Aldfield' he found *Asplenium adiantum-nigrum**. Further north at 'Hack-fall: upper part near River' grew *Astragalus glycyphyllos* (Wild Liquorice)*, and 'below Tanfield down the River Bank' was *Filipendula vulgaris* (Dropwort).

Gawthorp did not make many records to the west of Ripley. 'In Sturdy Lane, below Brimha craggs' he found *Paris quadrifolia**. *Antennaria dioica* grew 'At the low end of Lady riggs 1 mile above Pateley', *Cirsium heterophyllum* (Melancholy Thistle)* above Pateley, and *Trientalis europaea* (Chickweed Wintergreen)* 'on Toft Rigs next Moor-houses a mile above Pateley, among the Bent'.

There are some annotations of notable species further afield from Ripley and outside the area of the H.D.N.S. Gawthorp found *Ononis spinosa* 'near Adle Dam', *Asplenium adiantum-nigrum* at Burley 1 mile west of Leeds, *Picris echioides* (Bristly Ox-Tongue) 'at Sandall near Wakefield in a close below Mr. Touch's House', and *Inula conyza* (Ploughman's Spikenard) 'near Pontefract in a lane leading towards Wakefield'. There is a surprising record of *Pyrola rotundifolia* (Round-leaved Wintergreen) from Bramham Park. At Thorp Arch *Torilis nodosa* (Knotted Hedge-parsley) grew 'on the ledges of the Rock just below the Mill', and in the river near there was *Potamogeton perfoliatus*. The 'River Bank below Thorp Spaw' was another site for *Actaea spicata*, and *Caucalis latifolia* (Greater Bur-parsley) was found 'in Clifford Fields nr Thorp Spaw'. 'Betwixt York and Popleton' grew *Solanum nigrum* (Black Nightshade), and *Onopordon acanthium* about York. *Gentiana pneumonanthe* (Marsh Gentian) was seen on 'Charlton moor near Thirsk', and *Centaurea calcitrapa* (Red Star-thistle) 'below Newcautles'. Near Settle Gawthorp found *Armeria maritima* (Thrift) 'at head of Stockdale Fields in Bleaberrygill' and 'nr. Hinklehaugh', and *Polygonatum odoratum* (Angular Solomon's Seal) 'on the ledges of the scars above Astick pasture'. *Impatiens noli-tangere* (Touch-me-not) grew 'near Grigg Hall Underbarrow Westmoreland' and *Serratula tinctoria* at 'Winder-meer'. I do not know the whereabouts of Kaley Hall, near which Gawthorp found *Polemonium caeruleum* (Jacob's Ladder). The only record he seems to have made south of Yorkshire was of *Althaea officinalis* (Marsh Mallow) 'at Guy-Hurn, nr. Wisbech, Cambridgeshire'.

'Its epitaph is Ichabod' (i.e. the glory has departed) wrote Dr. F. Arnold Lees of *Osmunda regalis* in Nidderdale, and blamed the 'bipedal venality and greed that brought about its annihilation'. What glorious flowers we have lost from the localities where Gawthorp recorded them in the 18th century. Those familiar with the records of botanists in the 19th and 20th centuries in this area may be able to trace the progressive disappearance of some of these species. No doubt this was due in most cases to the changes of habitat, especially to the drainage of wet land and resowing of pastures. After much research, Sir Thomas Ingleby managed to identify many of the localities given by Gawthorp in the Ripley district, though nearly all the names have long since disappeared from usage. He suspected that many of the pastures were ploughed out during the War. Staveley Carr was drained. Other land, e.g. at Knaresborough, would have been built over. Many cornfield weeds are no longer to be found because of the use of cleaner seed corn and weedkillers. Among the plants Gawthorp found growing in corn were *Cichorium intybus* (Chicory), *Bupleurum rotundifolium* (Thorow-wax)*, *Sherardia arvensis* (Field Madder)*, *Galeopsis ladanum**, *Delphinium consolida* (Forking Larkspur), *Legousia hybrida* (Venus's-looking-glass), *Kickxia elatina* (Sharp-leaved Fluellen) and *Lythrum salicaria*. He also listed at Ripley *Agrostemma githago* (Corn-cockle)*, and described as too plentiful *Papaver rhoeas* (Corn Poppy) and *P. somniferum* (Opium Poppy)*. Bupleurum and Agrostemma have now been virtually eliminated throughout Britain.

It is surprising that Gawthorp did not mention the locality of Farnham Mires, nor the bog on Brimham Moor, and there are some unexpected omissions from his recorded species. Since his day some habitats have been gained, such as railway cuttings, grouse moors, and disused limestone quarries and gravel pits, and some plants have been introduced and spread. Some notable species are still to be found where Gawthorp recorded them over two centuries ago, particularly in localities which have changed little, e.g. Fountains Abbey. Others may yet be awaiting rediscovery by a search of the less disturbed sites.

I am very grateful to Dr. W. A. Sledge for suggesting and amending this paper, and also for his assistance, including the information about John Wilson, and for the modern equivalents of many of the plant names he used.

SWALLOWS

It is possible that swallows have associated with man ever since *Homo sapiens* first joined them in Britain. We do not know where swallows nested before there were buildings, but it is possible that – being a species with a preference for a roof over their heads – they bred in caves and shared them with man. As buildings developed, the association with humans would continue. It seems likely that a species so well known would be among the first of our birds to be named.

Because of the smallness of the human population and lack of communications, different names were probably used by each community. When the Romans came they brought a name that was already in use in many parts of Europe, and was used in literature until the English language developed. By the fourteenth century Geoffrey Chaucer in his poem 'The Parlement of Foules' used the present name, although with different spelling. He wrote:

> 'The swalwe, mortherere of foules smale
> That maken hony of floures freshe of heewe.'

The small fowls that the swallow was accused of murdering are now known as bees.

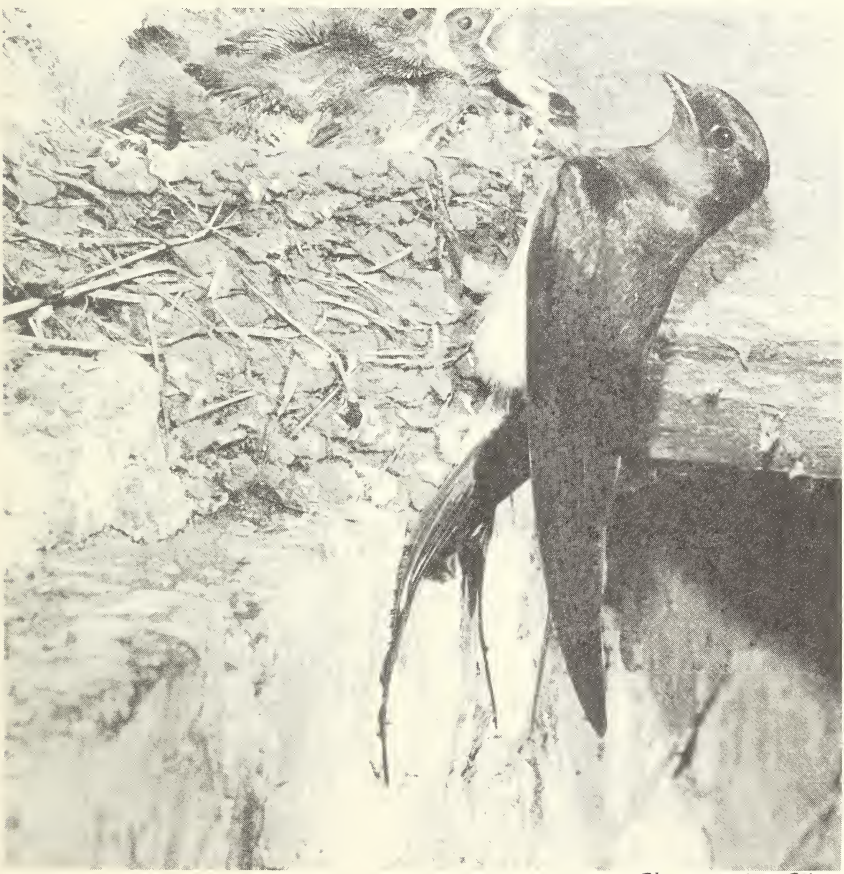

Photo: Arthur Gilpin

A FURTHER NOTE ON NEW ZEALAND DECOY

In recent summaries of information about the duck decoys of the Thorne Moors region (*Naturalist* **103**: 95–103, **107**: 69–71; M. Limbert, R. D. Mitchell and R. J. Rhodes, *Thorne Moors: Birds and Man*, Doncaster, 1986), no precise facts elucidating the origin of New Zealand Decoy could be given. However, a recent investigation of the J. S. Taylor Archives, held by the Archives Department of the Doncaster Metropolitan Borough Council, has yielded some relevant data. The archives include notebooks written by Taylor on aspects of the history of Thorne and district. These notes include details 'taken from a small ms. history of Thorne', compiled by a member of the Durham family (it is not exactly certain who) in 1923. Taylor commented that the manuscript history may have been taken largely from a paper written by Makin Durham (obituary in *Doncaster Gazette*, 31 March 1882), which was presented to a meeting of the Thorne Literary and Scientific Association on 31 May 1844. However, this cannot apply to some useful information which is included on the origin of New Zealand Decoy, partly constructed in 1880, but soon abandoned:

> The late Makin Durham C.E. improved the Thorne moors by constructing many drains and lowering the surface to bring it below the Ouse tide level, thus enabling it to be warped . . . Colonel Vickers carried on the work after Mr Durham's death. [Makin Durham] produced a scheme of dry warping which requires reservoirs to be made in certain places; the tides flow into them, till full of warp, after which the water should be let out, the warp is dried and conveyed by railway to the moor and high sandy lands. Mr Durham constructed two, one at the cottages near the moors at the end of Grange Farm, another near New Zealand called the Duck Decoy and now warped up . . . .

Clearly, New Zealand Decoy originated as an opportunist usage for a pre-existing pool which had become redundant.

MARTIN LIMBERT
Museum & Art Gallery, Doncaster

CHAMAEMYIA JUNCORUM (FALLÉN) (DIPTERA, CHAMAEMYIIDAE) IN YORKSHIRE (AND DERBYSHIRE)

The Chamaemyiidae are small, silvery flies with rows of dark spots on the abdomen in most species. Their larvae are aphid and coccid predators. *Chamaemyia juncorum* (Fall.) was recorded in Yorkshire from Allerthorpe Common (SE74, VC 61) early this century by Audcent, and from Spurn (TA41, VC 61) in 1946, but all records of *Chamaemyia* prior to Collin's key are suspect. Collin's key to the species of *Chamaemyia* (1966, *Trans. Soc. Brit. Ent.* **17**(IV): 121–8) describes *C. juncorum* as 'a species found in Scotland only' and states that 'all records of English specimens . . . are almost certainly incorrect'.

I have collected *C. juncorum* in the Pennines near Masham (SE1778, VC 65) in 1981, at Malham Tarn (Tarn Close and East Shoreline Plantation, both SD 8967, and the Fen, SD 8867, VC 64) in 1984, and at Eyam Moor (SK2278 and 2179, VC 57) in 1984. At Malham Tarn Fen and Eyam Moor the species was abundant, and at the former site it was taken with *Themira germanica* Duda (Diptera, Sepsidae), otherwise known outside Scotland only from two sites in Herefordshire (Pont, A., 1978, *Royal Ent. Soc. Lond. Handbook* **5c**: 17). These records are not too surprising as a number of 'Scottish' insects do extend down into the Southern Pennines, such as the water beetle *Agabus arcticus* (Paykull) (Lee, J., in Zasada, K. A. and Smith, E. H., 1981, *Sorby Record Special Series IV*, p.61) and the bluebottle *Calliphora loewi* Enderlein (Whiteley, D., 1978, *Sorby Record* **16**: 50).

I have also found *C. juncorum* in the lowlands of Yorkshire, which is more unexpected because this area is the north-eastern limit of many 'Southern England' insects. I have records from Allerthorpe Common N.R. (SE7647, VC 61) in 1984 and from nine sites in Rotherham (VC 63) – Maltby Wood (SK5491) in 1980, Fitzwilliam Canal, Parkgate (SK4394) and Wickersley Gorse (SK4790) in 1982, Ravenfield Park (SK4995), Rawmarsh

(SK4396) and Catcliffe Flash N.R. (SK4288) in 1984, and Maltby Dyke (SK5291) and River Don at Thrybergh (SK4594 and SK4595) in 1985. At the latter site it was taken in company with *C. paludosum* which has not previously been recorded outside the Cambridgeshire fens (I. F. G. McLean, *pers. comm.*).

The above notes indicate that *Chamaemyia juncorum* is widely distributed in Northern England and is sometimes quite common. I thank P. Skidmore (YNU Diptera recorder) for the early Yorkshire records and Dr I. F. G. McLean for helpful comments on an earlier draft.

BILL ELY
Clifton Park Museum, Rotherham.

BOOK REVIEWS

The Squirrel in the Trees, The Rabbit in the Fields, The Frog in the Pond and **The Crab on the Seashore**, each with a text by **Jennifer Coldrey** and photographs by **Oxford Scientific Films**. Methuen. 1986. Each 32 pages, copiously illustrated in colour & line drawings, and £4.95.

The first four titles in a new series, 'Animal Habitats', of attractively produced books on natural history for children. The informative texts are straightforwardly factual in approach, but simple in presentation and style, and accompanied by excellent illustrations. The two on rabbits and squirrels, which deal with a comparatively small number of species, are perhaps more successful than those on crabs and frogs where information on a wider range of species has to be compressed into the same short format; similarly, the photographs in these have to portray more species and consequently fewer activities.

A very commendable publishing project, which should appeal both to young naturalists and to their teachers.

Profitable Beekeeping by **Laurie R. Croft**. Pp. 104, with 8 figures. Elmwood Books. 1986. £4.95.

Amateur beekeepers often feel insecure about their charges, and every new book is eagerly thumbed through; is this the one that will really tell me what to do and how to do it? Swarm-control-at-a-glance? Queen-raising-in-five-simple-steps? What a blessing that book will be when it comes on the market, and how well it will sell. *Profitable Beekeeping* is not the one we are looking for. To be fair, it doesn't claim to be; its main message is that beekeeping is less popular in Britain than it ought to be, and that beekeepers can profit in all kinds of ways besides selling honey. It is helpful, positive and enthusiastic, and shows some of the basic methods of beekeeping. There is sound advice for the beginner about getting good instruction before starting, avoiding heavy outlay on expensive equipment, keeping gentle stocks, and collecting swarms from difficult situations. I do not see it, however, as a beginners' book, and I seriously doubt if beginners should start with the hope of making profit; they'll be lucky to break even over a number of years. Like Dr Croft I'd be glad to see more backyard beekeeping, but I think profit comes from successful management in bad seasons, rather than from selling propolis to violin-makers or making shoe polish from beeswax. Interesting, idiosyncratic, and cheerful nevertheless.

BS

Mr Marshal's Flower Album from the Royal Library at Windsor Castle. Introduction and commentary by **John Fisher**, preface by **Jane Roberts**. Pp. 128, and 36 colour plates. Victor Gollancz. 1985. £20.00.

Alexander Marshal died at Fulham Palace on 7 December 1682. His origins are obscure but he was a well-known artist by the late 1640s when he painted a portrait of the Countess of Dysart. In 1658 he was described as a gentleman artist 'comparable with any now beyond seas'. Marshal's known works include several oils and this album of flower paintings, the so-called Windsor Florilegium which contains 161 (originally 164) folios. Thirty-six are reproduced in this slim, expensive volume.

This book is a mere sampler of Marshal's work. John Fisher's commentaries on the flowers provide some interest for the general reader, but I did not see any point in a long discussion of *Gentiana verna* which (as Fisher states) is *not* depicted. Jane Roberts's excellent biography is certainly of value to historians of art and natural history.

The plates in this book show a range of flowers. Some native British plants are included, but there is a preponderance of exotic subjects, most of which are familiar garden plants: daffodils, hyacinths, the hardy Virginian *Tradescantia*, and of course tulips which were so fashionable in the mid-seventeenth century. The portrait of auricula cultivars (p. 33) is striking and shows what variety gardeners enjoyed during the mid-1600s. Marshal's technique is outstanding, equalled by only the best modern botanical artists, and his colours seem to have stayed fresh.

On some of the plates there are animal vignettes, often caterpillars and insects, but occasionally larger beasts, as for example, a grass-snake, a dog and a 'Mexico munkey'. I am inclined to think that Marshal was a better painter of animals than of plants, but this book does not contain a fair representation of his work. The standard of production of this slim volume is shoddy. I am disgusted by the treatment of some of the plates. Why, in a book costing £20, are we treated to reproductions in which parts of the plates are deliberately truncated – the coils of the grass-snake, the dog's tail, the base of the dog's tooth violet? For the sake of including the folio number (in the top-right hand corner) the designer has left large areas of blank paper but ruthlessly chopped chunks off the base and sides of each plate. The original folios measure 47 × 35.3 cm and the reproductions 24.8 × 17.2 cm (a reduction to about half size); could not the page size have been increased a little and the whole plate been reproduced, scruffy margins and all? It is a serious defect in this book, which makes me refrain from recommending it except to the most ardent collectors of Royal coffee-table books, and to historians of botanical art and natural history. ECN

The New Where to Watch Birds by **John Gooders**. Pp. 224, with many maps. André Deutsch. 1986. £7.95.

Birdwatchers who know the earlier version of this book will rejoice at the new edition, which has gained in length and strength and lost nothing. Newcomers to birdwatching in Britain are simply advised to buy it. It tells you where to go, how to get there, and what to look out for; it is sensibly laid out, and covers minor as well as major places of interest. There is no better guide to British birdwatching sites on the market. BS

Gilbert White: A Selborne Year. The 'Naturalist's Journal' for 1784. Edited by Edward Dadswell and illustrated by Nichola Armstrong. Pp. 128, fully illustrated in colour. Webb & Bower/Michael Joseph. 1986. £10.95.

Many of us will think of Gilbert White as the author of a single, much-loved work, *The Natural History of Selborne*. However, he was also an indefatigable diarist and record-keeper, drawing on his observations over the last 26 years of his life to write his *magnum opus*. Here we have just one of his notebooks, that for 1784, a year remarkable for its extraordinary weather conditions. This is the first time it has been published in its entirety, and it provides some insights into White's domestic life and the activities of his servants and neighbours. It must be confessed, however, that an undue amount of space is taken up by his laconic and repetitious weather reports, e.g. 'Sept. 4. Vast dew', 'Sept. 5. Vast dew', 'Sept. 8. Vast white dew', 'Sept. 11. Great dew', etc., etc. Also, in spite of the sub-title, the natural history content is only mildly interesting and contains little of real scientific merit.

The illustrations are of two kinds, portraying on the one hand stylized country scenes and rustic pursuits, and on the other, fairly detailed studies of individual plants, birds, etc.; the former seem much more suited to a child's picture book or greetings-card, with unnaturally twisted trees and brightly-clad peasants; the latter are generally more satisfactory (although the plants depicted on pp. 66–67 should have been numbered to correspond to the would-be explanatory rubric; as it stands it is unintelligible). VAH

The Wild Life Parks of Africa by **Nicholas Luard**. Pp. 240, illustrated with monochrome and colour plates. Michael Joseph. 1985. £15.95.

This book is divided into two main parts: the first deals with the problems and processes of managing wilderness areas and the second provides an inventory of the parks existing within the continent. The former is introduced through a historical outline of the growth of the National Park movement in Africa, followed by a chapter outlining the habitat and habits of wildlife in, particularly, the savanna environment. The author handles the procedures and logic of managing populations with care and sensitivity. He commendably selects his examples from a broad spectrum of localities and species. The short account of each park includes data on its size, location, area and an evaluation (graded from A to C) of the facilities for the ordinary visitor, with a guide to the best months of the year to visit each of them. General descriptions of the topography, vegetation and common animals the visitor may expect to see are also provided.

By virtue of its first part this book is more than a useful guide. It is useful reading for those interested in African fauna and is particularly valuable to anyone contemplating a safari to the game parks of Africa. Its good quality wildlife illustrations complement the text well.

AVD

CONTRIBUTORS

Archer, M. E., 31–33, 38, 109, 145
Atherden, M. A., 97

Beaumont, H. E., 110–111
Blockeel, T. L., 33–35, 100
Boyle, P. J., 70–71
Bramley, W. G., 99–100
Brightman, F. H., 24, 48
Burnham, P. M., 79–86

Chicken, E., 87–90
Crackles, E., 23
Cross, T., 71
Crossley, R., 41–46, 146
Cundall, R. D., 147–150

Dare, P. J., 49–54, 129–137
Davies, B. E., 112
Davis, B. N. K., 9–15
Delany, A. V., 37, 155
Denton, M. L., 91–96
Dickinson, B. M., 69
Disney, R. H. L., 113–121
Duncan, J. E., 90

Elliott, J. M., 125–128
Ely, W. A., 101, 103, 106–107, 152–153

Flint, J. H., 25–30
Foster, S., 21–22

Gilbert, O. L., 111
Gilpin, A., 91, 151
Grant, D. R., 99, 101–102, 104, 107–108

Hale, W. H. G., 72
Hambler, D. J., 70, 110
Hawkswell, A., 99–100, 102
Henderson, A., 139–144
Heron, A., 99
Hewson, R., 73–78
Higginbottom, T., 105–106
Hind, R. D., 69
Hinton, V. A., 39, 111, 124, 154
Holliday, S., 106
Howes, C. A., 109–110
Hyatt, K. H., 17–21, 55–59

Lee, P., 103, 106, 107
Limbert, M., 59–60, 151–152
Little, B., 123–124

Mather, J. R., 54, 68–69

Nelson, E. C., 153–154
Norris, A., 97–98

Pashby, B. S., 102, 103
Payne, J., 100, 101
Payne, K., 98–99
Pearson, J. A., 104, 108
Pellant, C., 97–109
Pellant, H. S., 97–109

Reid, C., 121–123
Richardson, D. T., 69–70
Rimington, W. E., 67–68
Robertson, J., 102, 104
Roome, N. J., 35–36
Rotherham, I. D., 61–67

Seaward, M. R. D., 36, 38, 39, 68, 71–72, 124, 138, 144
Sharp, C., 15–16
Smith, C. J., 99, 103–104
Smith, D. H., 105
Smith, J. K., 36–37, 37, 112
Stonehouse, B., 152, 153

Taylor, R., 108
Thayre, M. E., 137–138
Tullett, P. A., 125–128

Wall, T., 102, 109
Wallis, A. J., 97, 100–101, 102–103
Whitehead, J., 15–16

Yalden, D. W., 3–8, 47, 47–48

INDEX

Acarology
A new species of *Poecilochirus* from Yorkshire, 17–21; *Amblygamasus dentipes* new to the British Isles, 55–59

Biography
Naturalists on Hatfield Moor, 59–60; Botanical records made by William Gawthorp, 147–150

Book Reviews
35–39, 46–48, 54, 68–72, 90, 109–112, 123–124, 137–138, 144, 152, 153–155

Botany
Juncus ambiguus in Yorkshire, 23; *Rhododendron ponticum* in the Peak District and Sheffield area, 61–67; *Taraxacum* in south-east Yorkshire, 87–90; Botanical records made by William Gawthorp, 147–150

Bryology
YNU Bryological Section: annual report 1984–1985, 33–35

Crustacea
Chinese Mitten Crabs, 146

Entomology
Insect fauna of Common Rock-rose, 9–15; Hemiptera report, 21–22; Coleoptera reports, 25–30, 91–96; Aculeate Hymenoptera report, 31–33; *Bombus monticola* on heather moorland in north-east Scotland, 73–78; Two new species of Scuttle fly from Malham Tarn, 113–121; Coleoptera from lowland wetland in north Northumberland, 121–123; *Vespa crabro* nesting in Yorkshire, 145; Notable insects at Caydale, 146; *Chamaemyia juncorum* in Yorkshire, 152–153

Film Review
24

Lichenology
Acarospora umbilicata new to Yorkshire and *Polysporina dubia* new to England, 139–144

Mammals
Small mammals at Filey, 15–16

Natural History
Forty years on: changes in natural history studies since 1945, 41–46

Obituary
George Edward Hyde, 67–68

Ornithology
Black Grouse in the Peak District 1975–1985, 3–8; Kestrel population of Snowdonia, 49–54; Breeding birds of a stretch of the River Tees 1979–1983, 79–86; Short-eared Owl, 91; Breeding biology of Ravens in two upland regions of North Wales, 129–137; Swallows, 151; New Zealand decoy, 151–152

Parasitism
Helobdella stagnalis as a hyperparasite of *Hirudo medicinalis*, 125–128

Yorkshire Naturalists' Union
YNU excursions in 1985, 97–109

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Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

The Lepidoptera of Yorkshire

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EVIDENCE FOR THE FORMER BREEDING OF THE GOLDEN EAGLE IN YORKSHIRE

GEOFFREY FRYER

More than 60 years ago Stubbs (1923) produced evidence which suggested that in the eighteenth century the Golden Eagle (*Aquila chrysaetos*) nested in Yorkshire at Ravenstones in the parish of Saddleworth. This site is only about 10 miles from the Derbyshire locality in which it certainly bred until at least 1668, when John Ray recorded the fact, and doubtless for some time after that date. Indeed, without citing any evidence, though perhaps on the basis of a bird caught alive there in 1720, *The Handbook of British Birds*, first published in 1939, says of breeding in Derbyshire, 'about 200 years ago'. Chislett (1952) and Mather (1986) make almost identical references to Stubbs's article in their respective books on the birds of Yorkshire and are non-committal about its validity. However, Bannerman (1956), who could only have been citing Stubbs, either directly or via Chislett, adds 'and apparently too in Yorkshire' to his quotation from *The Handbook* concerning former breeding areas.

Curiously neither Chislett nor Mather was apparently aware that Stubbs (1931) subsequently produced additional information about the Ravenstones eagles, including the name of the man who robbed the eyrie. As this information, omitted from the two most recent standard works on the birds of Yorkshire, seems in danger of slipping into oblivion, a brief summary is given here before reference is made to a further possible breeding site less than five miles from Ravenstones, that, so far as I am aware, has gone unnoticed by natural historians.

Stubbs's first article quoted a poem by a Saddleworth man, Samuel Bottomley (1738–95), published about 1790, which makes specific reference to eagles building on Ravenstones, and in the lines

> Bold was the man who, hanging o'er the vale,
> To seize their young the dangerous cliff dared scale

intimates that the nest had, on at least one occasion, been plundered.

His second article produced more concrete evidence from newspaper cuttings preserved in the Oldham Public Library. One of these, dated 22 August 1868, almost certainly from the *Ashton-under-Lyne Reporter*, written by John Higson (d.1871), a local historian, gives information on 'Edmund Frier', which like 'Old Yed' was a nickname for Edmund Gartside, though Higson was apparently unaware of this fact. After describing 'Edmund Gartside' (*alias* Frier) as 'an enthusiastic hunter, fisher, birdcatcher and poacher' and quoting reminiscences of one who remembered him, the cutting goes on to say that perhaps his crowning feat was that recorded in Bottomley's poem (though he is not there named). It then states categorically that 'formerly a pair of Eagles annually built their nest on Ravenstones' and goes on to describe how 'On one occasion a party of Saddleworth folks determined to rob the nest, and for that purpose Frier was let down from the summit by ropes, whilst Mr Ralph Whitehead, of Grasscroft and his cousin Mr Timothy Whitehead, stood ready with their guns to fire at the old birds in case of attack. It is said that only one of them appeared on the scene, and that not within gunshot . . . It sailed high over the moors never again to visit the scene of the outrage. There proved to be only a single eaglet in the nest, and this was taken to Mr Whitehead's at Grasscroft, and kept in the fold, with a chain attached to one of its legs. One day the manacle was removed . . . The bird . . . rose majestically into the clouds and never returned either to Grasscroft or Ravenstones.'

The details are very precise, individuals are named, and the report that there was only a single eaglet in the nest accords with the most frequent situation. The statement that a pair 'annually built their nest' at Ravenstones also has an air of authenticity about it, is in keeping with the habits of the species, and is made in a matter of fact way that suggests that the writer did not find the fact particularly surprising.

Stubbs ascertained that Edmund Gartside was born in 1736 and that what he believed to be the relevant Ralph Whitehead died, aged 41, in 1755. The incident can therefore be fixed as not later than 1755, when Gartside would be of a suitable age for the exploit. He died in 1815 aged 79 and achieved local fame as the hero of a hunting-song written after his death. Stubbs also cites another mutilated newspaper cutting of uncertain date from one or other of two Ashton newspapers. This, by a George Newton, bore the title 'Reminiscences of Old Yed Friar, or Edward Gartside' (names were evidently treated somewhat casually at that time and Frier, or Friar, was also spelled Freer). The writer remembered Gartside well, and recalls how, on one occasion, he went hawk-catching with him, securing a glead (either a Kite or a Buzzard for, while the name is generally applied to the former, it appears to have been used for both species in the North of England). He notes how Gartside 'displayed great presence of mind . . . in connection with taking the eagle from Ravenstone Rock', an incident with which he was clearly familiar, though only, of course, at second hand. Newton was clearly much younger than Gartside and was probably not even born when the eyrie was robbed. The reference to the glead, whose wingspan is noted as being over four feet (suggesting a Buzzard) provides evidence, if that were necessary, that the eagle was not being confused with a Buzzard — then no doubt a not unfamiliar bird in the area. The nest-robbing incident is also mentioned briefly in James Butterworth's *History of Saddleworth* (1828), recording of Ravenstones that 'from the top of which a person descended by means of a rope, for the purpose of taking a young eagle from its nest, in which project he succeeded'. As Stubbs remarks he may either be using the information contained in Bottomley's poem or availing himself of oral tradition. However, while Butterworth would know the poem, it might be noted that his statement is more precise. It refers to a specific instance, and reports the success of the venture, neither of which is the case in Bottomley's poem. That Joseph Bradbury also reports the incident in his *Saddleworth Sketches* (1871) is not important as he had no new information to impart.

Stubbs refers to the isolated nature of the region around Ravenstones. Similar conditions long prevailed on the adjacent eastern flanks of the Pennines and it is for this area that further fragmentary evidence for the nesting of eagles exists. While less precise than that appertaining to the Ravenstones eyrie it is clearly more than hearsay and it is interesting that it concerns the same general area. The information is given by Whitehead (1942) in a book entitled *Bygone Marsden*, a work on local history and reminiscences relating to the village of Marsden, whose parish boundaries are contiguous with those of Saddleworth. The relevant passage, given on pp. 143–4, is here quoted in full.

'On Shorter Nab [referred to also as Shooters Nab, and so named on Ordnance Survey maps] and the neighbouring heights was to be found so recently as the early part of last century that king of birds, the eagle. It was no uncommon thing for a stray lamb to be carried to its rocky haunts, and there devoured.

'I remember one of Marsden's quaint old worthies telling of an incident that happened in his father's boyhood. The older man was then working on the land in the vicinity of the Chain [i.e. beneath Shooters Nab]. Lambs were skipping about a neighbouring field, when he suddenly heard the anxious bleat of an ewe and the painful whine of a lamb. On looking up he saw to his surprise the poor little creature in the grip of a large bird, which apparently without any effort carried off its prey to the adjoining rocks of Shorter Nab, there to enjoy a dainty morsel.

'Men and boys were occasionally lowered over these rocks to plunder the nests and destroy the young, or maybe to secure the remnants of some fleshy meal. Ultimately this noble bird was driven from his haunts and became extinct. The last record we have of their presence in Marsden was in the year 1851, when old Matthew Flint, of Great Clough, shot a couple of eagles and sent them as a present to Messrs Fielding of Todmorden, who at that time held the shooting rights of the Manor of Marsden.'

The shooting of eagles by Flint is repeated almost verbatim on p. 147 as one of a number of miscellaneous items, with the addition of 'Wessenden' after Great Clough. Wessenden is a valley, subsequently occupied by reservoirs, that cuts deep into the moorland south-west of Marsden.

The writer of this passage, Lewis Buckley Whitehead, whom I met and who died in 1958 aged 89, was a well-read, intelligent man interested in literary and historical matters, but not a naturalist. The prose style must be judged in the context for which it was intended and not as a scientific statement. Nevertheless several interesting facts can be accepted and deduced.

First, there is no reason to doubt the authenticity of the lamb-taking incident which is the kind of event that would be remembered and doubtless retold by the one who witnessed it. Indeed his son recalled it many years later though he was not even born when it happened. As Whitehead was born in 1869, and may well have heard the story from his 'quaint old worthy' at the turn of the century when the latter was 70 or more years old, the incident witnessed by the 'old worthy's father in his boyhood must have occurred early in the nineteenth century. Whether the bird in question was a Golden Eagle or a White-tailed Eagle *(Haliaeetus albicilla)* cannot be ascertained. While the latter is perhaps the more frequent lamb-taker the former is the more likely species to have frequented the region. Both species have been recorded within a few miles of the area more recently than the time of the incident (see Mather (1986) for most of the known reports).

Indeed Whitehead's account makes the categorical statement that old Matthew Flint shot 'a couple' of eagles in the Marsden area in 1851. This information was clearly passed on to him by Flint himself for in the Introduction to the book Matthew Flint, Great Clough, is listed as one of the notables among 'the many old Marsden men' interviewed, and from whom aid was received. The date is precise, the recipients of the carcases are named, and the shooter would surely be aware of the identity of birds sent to the holders of the local shooting rights. The implication is that these birds were mounted, and some years ago I attempted to trace them, but without success. Perhaps they still exist. Again specific identity is not stated but Golden Eagles are presumably implied. That two birds were involved is particularly noteworthy and implies a pair. Whitehead indeed probably meant a pair by the term 'a couple'.

Which brings us to the statement that eagles nested on Shooters Nab and that the nests were occasionally plundered. There is nothing to substantiate the statement and nothing to indicate from whom Whitehead obtained his information, but he recorded in good faith what must have been passed on by one or more of his informants. Taken in conjunction with the lamb-taking incident, the presence of eagles in the area as recently as 1851, the proximity of a probable eyrie at Ravenstones just over four miles distant and of the Derbyshire eyrie less than 15 miles away, and bearing in mind the nature of the terrain and the suitability of Shooters Nab as a breeding site (see below), some credence must be given to the statement. The occurrence of a Golden Eagle in the same area in 1982 is a mere coincidence in this context.

The lamb-taking incident is relevant here. There is no suggestion that the man who witnessed this had personal knowledge of an eyrie or of its plundering. He may, however, have remembered stories, which would certainly be recalled as he recounted his experience, of events that took place much earlier, and he and others may well have passed these on, just as he passed on his own experience with an eagle — an experience that found its way into Whitehead's record well over a century later. If the incident occurred around 1815, when the observer was 15 years old, a man of 80 could have told him of events *witnessed* 60 years earlier (i.e. back to at least 1755) and, if he were to recall events recounted at that time by a man of 80, that occurred 60 years earlier, we are back to 1695 or somewhat earlier. This is approaching, or perhaps within, the period that eagles certainly bred in Derbyshire and well within the period that they appear to have done so at Ravenstones. To put the time scale into perspective, it is 136 years since Matthew Flint shot his eagles, yet I met a man to whom he personally reported the fact, and could have done so less than 30 years ago. Thus, while the story cannot be proved, there is an *a priori* case for giving credence to it.

The nature and location of the terrain are relevant here. Shooters Nab is less than 15 miles from the Derbyshire locality in the Woodlands Valley where the Golden Eagle is known to have nested, and separated from it even today by essentially uninhabited

moorland, as it is from Ravenstones just over four miles to the south-west. Ravenstones is about 10 miles from the known Derbyshire eyrie. Thus the only three English localities for which information on the former breeding of eagles exists outside the Lake District and the Cheviots lie within less than 15 miles of each other. This seems more than coincidental. There is also the possibility that Shooters Nab served as an occasional alternative site for the Ravenstones eagles.

The terrain within and around this area is suitable eagle habitat and there is more open moorland, with occasional wooded cloughs, north of Shooters Nab. As at Ravenstones there is at Shooters Nab a long, rocky cliff, at an altitude of about 1400 ft, which continues to Deer Hill (a name suggestive of a mammal now extinct in the area), which would appear to provide suitable nesting sites. Eagles do not always demand large precipitous crags for their nests. Indeed these are probably the most suitable potential nesting crags in the area though their original state cannot now be ascertained as they have been quarried to provide stone for reservoir construction. Immediately behind the rocks the land rises to 1641 ft at the summit of West Nab, and to greater altitudes a little further south.

The present Chain Road, which passes within some three-quarters of a mile of the rocks of Shooters Nab, is still the nearest road. It follows the course of an older road, but disturbance from this would be slight as it lies several hundred feet lower than the rocks and possibly saw no wheeled traffic until after implementation of the Turnpike Act of 1758. Its condition at this time was bad as is noted in the preamble of the Act, which is quoted by Crump (1949). The remarks are not specific to one place and could have applied to any part of the road between Wakefield and the Lancashire boundary but the state of the roads near Marsden can be judged from the tradition that the pews for Marsden Chapel, rebuilt 1758–9, came from Saddleworth in a waggon that could not get into the village for want of a cart road and that people gathered, not just to carry the pews, but to see the conveyance, no cart or waggon having previously been seen there. Indeed as Kendall and Wroot (1924) point out when illustrating the influence of geology on history, access to many now important West Riding towns was almost impracticable for wheeled vehicles until well into the eighteenth century. The then isolated nature of Shooters Nab is also put into perspective by remembering that the population of Marsden in 1750 was only about 700. Stubbs (1923) noted the proximity of a pack-horse road to the Derbyshire site when the Golden Eagle nested there and that there were many houses in sight.

Thus, although not proven beyond all doubt, it is virtually certain that in the eighteenth century the Golden Eagle nested in Yorkshire at Ravenstones and possibly did so also at Shooters Nab in the same area. This is not entirely surprising. In England it bred in the Lake District until towards the end of the eighteenth century, and of course has persistently done so again in recent years. In the Cheviots it bred until well into the nineteenth century, and it did so in close proximity to the probable Yorkshire sites in the seventeenth and possibly eighteenth centuries.

That breeding in Yorkshire was not recorded by naturalists is not entirely surprising. There was not much documentation of such events at the time, and certainly not in the isolated and then sparsely populated region involved. By the time the first local lists appeared such events were more likely to be known by historians than by naturalists. Matthew Flint's eagles, shot in 1851, are not recorded in county or local avifaunas so it is not surprising that information relating to events of a century or so earlier has gone unnoticed in such works. The scant knowledge of the avifauna of the Pennine uplands in the area in question more than a century ago can be gauged from the notes in the second edition of Hobkirk's *Huddersfield: its History and Natural History* (1868). References are almost entirely to the area east of the town and upland birds were clearly poorly known. For example, of the Merlin (*Falco columbarius*), a moorland species *par excellence* that certainly bred within the area, the only records are three occurrences in the lowlands east of the town, while the Golden Plover (*Pluvialis apricaria*) was only 'Noticed at Almondbury and Fixby' whereas its true home is on the moorlands which it doubtless frequented as it does today. As time passed ornithologists would be less and less likely to be aware of the former breeding of a bird long extinct in the area. It is possible, however,

that additional documentary evidence exists in local histories, churchwardens' accounts or elsewhere. If unearthed, any such evidence should be made known.

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BOOK REVIEWS

A Field Guide to the Dragonflies of Britain, Europe and North Africa by **Jacques d'Aguilar, Jean-Louis Dommanget** and **René Préchac**. English edition revised and translated by **Stephen Brooks** (Consultant), **Nicola Brooks** and **T. S. Robertson**. Pp. 336, with 130 maps and numerous text figures, and 27 colour plates. Collins. 1986. £14.95.

Here at last is a book in English that we can take into Europe and use to identify the dragonflies that we see or, more accurately, catch. Its title may imply that it can be used, as can its earlier companion volume on birds, to identify the living dragonfly at large in the field. This is possible with the larger distinctive species, but many closely-related pairs or groups will require the much more critical examination and careful comparison with the text that can only be made with the insect in the hand.

The book falls into several distinct sections, those concerned with identification being the detailed key to genera, the colour illustrations, the detailed description of species and the distribution maps. The key is clear and abundantly illustrated by line drawings. The life-size colour illustrations, with some enlargements of parts of the insect in critical cases, convey an adequate impression but would have been better at twice the size although this would affect the layout of the work and increase its size. Not all the species are illustrated and it is essential to consult the detailed description of all the species in a genus after making a tentative identification from the plates. The descriptions include notes on habitat, behaviour and distribution. The sensible person will ignore the coined English names, Keeled Skimmer, Scarce Chaser, etc. The distribution maps convey a general impression of the boundaries of each species but tend to indicate a more extensive range than is actually the case; note *Lestes dryas* in England.

Introductory text on structure, life history, habitats and behaviour will be helpful to the beginner, but the book's main purpose is identification, and this it achieves. It is the most convenient book to take into the field in England since Cynthia Longfield's volume in the Wayside and Woodland series. Some small criticisms can be made: it is a pity that distribution maps only have numbers and not names, and the colour plates of habitats, with explanatory legend on opposing pages are most curiously and irritatingly aligned. However, such criticisms are quite outweighed by the considerable merits of this most useful and welcome volume, which is good value for money.

JHF

Collins' Guide to the Insects of Britain and Western Europe by **Michael Chinery**. Pp. 320, with numerous coloured illustrations and line drawings. Domino Books. Collins. 1986. £6.95.

This beautifully and profusely illustrated new book will inevitably be purchased by most field naturalists and others possessing a passing interest in insects, especially those who regularly holiday in southern Europe. The plates alone render the book a delight and should assist in the identification of some of the more unusual insects met with in southern climes. The artwork is the work of a team of our most notable entomological draughtsmen, including Denys Ovenden, Steven Falk and Richard Levington, who, along with their colleagues are to be complemented on their superb handiwork. Surprisingly one has to turn to the final paragraph of the last page to learn who has helped with the graphics in the book.

Anyone purchasing this book who assumes that it effectively replaces and improves upon the author's previous work in this series, *A Field Guide to the Insects of Britain and Northern Europe*, will be disappointed. That work, despite its title, included southern Europe species like the mantis *Iris oratoria*, but the present work shows many more southerners. Textually the new book falls far short of the earlier one in many respects, notably in the absence of keys to families, lists of essential references, authors' names for species mentioned and in the far less logical ordering of the taxa. Thus the family Syrphidae has an 8 line description whilst there is no family heading for the next 4 families until Tephritidae is reached. This curious system is used throughout the book but there is no means whereby the user can ascertain the family of an insect he may wish to identify.

The new book then is clearly not intended to be a revision of the earlier one, but neither can it be regarded convincingly as a companion volume since the majority of species discussed appear to be present in both books. Comparison of the two works testifies to the almost ephemeral nature of some scientific names and this will lead to some confusion amongst the uninitiated. Thus *Eumenes unguiculata* in the first book appears as *Delta unguiculata* in the second. The author of the books cannot of course be held responsible for these name changes but where they occur the name used in the earlier book could usefully have been inserted. A very confusing notation for status/distribution has been used in that in the earlier work a solid black triangle indicated a non-British species, whereas in the new one it indicates a species found throughout the British Isles. However, the system falls down in places, for the author would have us believe that *Carabus auratus* and the three British Cardinal beetles are all to be found throughout our islands! A number of additional errors have been noted. For instance the larva on p. 294 entitled 'Snipe fly', and referred to on p. 198 under *Rhagio scolopacea* is actually the very different larva of *Xylophagus* which lives under loose bark of trees. *Anthomyia pluvialis* is entered twice consecutively on p. 216, the second time wrongly spelt. The next species discussed, the Cabbage Root fly, is given the wrong specific name; it should read *Delia brassicae*. The figure appears to be of this species, not *Paregle radicum* (L.). *P. radicum* is an eurytopic species.

Dimensions would have been best indicated by linear scales. On the pages showing insect larvae (pp. 294–7), the footnotes 'mostly somewhat enlarged' are misleading as most are at least twice natural size.

Despite the critical tone of this review, this book gives a very good broad picture of the range of insect forms found within the geographical area covered and the illustrations are a sheer delight in themselves. Providing the limitations in the utility of the book in terms of critical identification work are recognized, this attractive volume deserves a place on the shelves of all naturalists desirous of broadening their horizons. It is highly likely that more people will become fascinated by insects for their sheer beauty alone and that further conservation of their habitats will result to the benefit of all.

The new book should occupy a place next to the author's splendid earlier work, *not* in place of it. The text is better in the earlier book but the plates are generally far superior in the new one.

PS

A REVIEW OF MINKE WHALE (*BALAENOPTERA ACUTOROSTRATA* LACEPEDE) IN THE HUMBER AND YORKSHIRE WATERS

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Introduction

The minke, pike or as it has traditionally been referred to in the Yorkshire literature, the lesser rorqual whale, occurs throughout the world's oceans.

In the North Atlantic there appear to be distinct western and eastern populations. For both groups breeding takes place in Equatorial waters during the winter months, mostly between October and March, the whales having paired some 10 months earlier (Evans 1980). In spring the family groups move into high latitudes, the eastern population heading for the main summer feeding grounds off the Norwegian coast.

Important food sources are krill, sand eels (*Ammodytes* sp.) and caplin *(Mallotus villosus)*. Herring (*Clupea harengus*), cod (*Gadus callarias*) and mackerel (*Scomber scombrus*) are also taken (Evans 1980).

During late summer some individuals move down into the northern and central North Sea, possibly attracted by herring which congregate in this area during August to spawn.

The return migration, which takes place in autumn, follows the same route, animals normally avoiding passing south via the North Sea and English Channel. Scarcity of sightings and strandings off the western shores of the British Isles suggest that both northerly and southerly passages take place some distance west of British waters.

The only hunting around Britain is by the Norwegian whaling industry operating around the Faroes and Shetlands and into the northern North Sea, where catches have been declining since 1969 (Evans 1980).

Field Notes

1. On 13 July 1982, a 26 ft (7.9 m) adult male minke whale was found stranded on the Holderness coast between Hilston and Tunstall (TA/302333).

   Preliminary details and a fragment of baleen were sent to the British Museum (Nat. Hist.) by Mr T. S. Smith of the coastguard service. An illustrated account appeared in the *Hull Daily Mail*, 14 July 1982, and other reports followed on 15 and 16 July. Much of the specimen's skin had sloughed off, suggesting that the animal had been dead and decomposing for some time, and part of its jaw was broken.

   The Holderness Borough Council, whose responsibility it is to deal with such strandings, attempted to dispose of the carcase by burning it *in situ*, but on 15 July 1982, before the process could be completed, M.J.B., together with A. C. Credland, D. Northmore and S. Moran, after a prolonged and thoroughly noxious exercise, salvaged the partly charred skull, two ribs, the atlas and two other vertebrae for the Hull Museum collection (Moran 1982).
2. On 29 April 1985 the carcase of a cetacean with throat grooves, identified as a *Balaenoptera* sp., was found stranded in the lower reaches of the tidal Trent at Burton-on-Stather (SE/8618) (M. C. Sheldrick, *pers. comm.*).

   The specimen evidently drifted back into the Humber and on the high tide of 6 May entered the lower reaches of the tidal Ouse, stranding apparently for one tide only on the mud spit at Goole Fields (SE/7521) (*Goole Times* 9 May 1985).

   The 17 ft (5.1 m) long carcase was finally beached well up on the saltings at Broomfleet Island (SE/887263) by a very high tide on 7 or 8 May, where it was initially examined by Mr P. Beriff of the coastguard service (*Hull Daily Mail*, 5 June 1985). On 17 May the carcase, sufficiently decomposed to have lost its baleen plates and a considerable amount of skin, was photographed by D.B.C. and its identity and

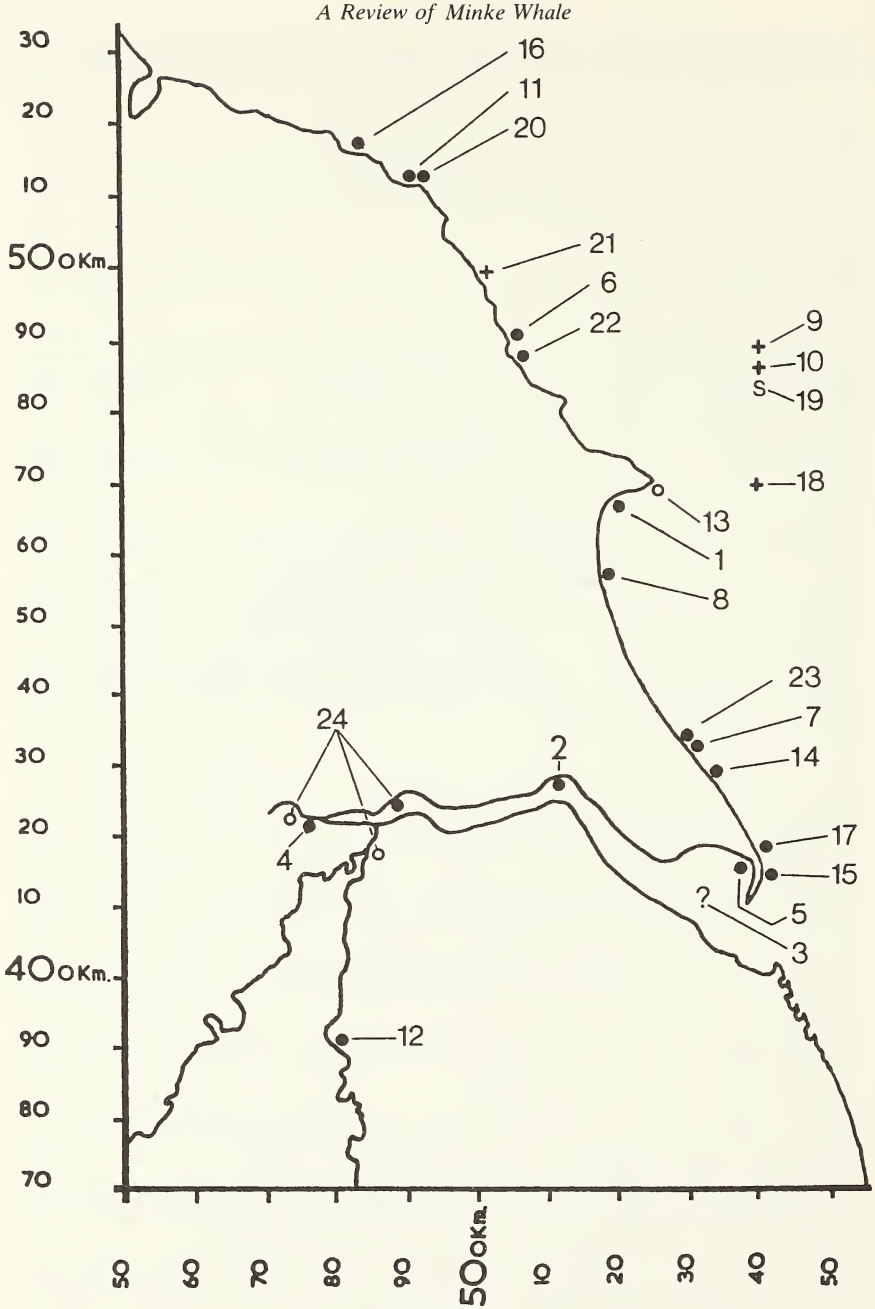

FIGURE 1
Localities of strandings (•) Temporary strandings (○)
Sightings (s) and skeletal material (+) in Yorkshire waters

measurement confirmed by M.J.B. On 29 September M.J.B. collected the skull, right humerus and one vertebra for the Hull Museum collection.

During the winter months almost all the flesh disintegrated and on 10 March 1986 the remains of the skeleton, missing only a few vertebrae and intervertebral discs, were removed by C.A.H. to Doncaster Museum. As with the Hilston specimen, one of the mandibles was found to be broken at the distal end.

The skeleton was exhibited at the 1986 Mammal Society conference where, due to its lack of epiphyseal fusion, it was judged to be that of a very young specimen.

Interestingly, other 'lesser rorquals' have been stranded in the Humber catchment. One found in the Victoria Dock, Hull, 9 September 1869, was skeletonized and placed in Hull Museum (Clarke and Roebuck 1881), one was in the Humber in 1873 (Smith 1905), one stranded in January 1902 on the mud at Swinefleet (Bunker 1905), one was killed on the sand banks on the Humber side of Spurn peninsula, 15 August 1905 (Audas 1905) and on 17 September 1938 one was killed in the Trent at Gainsborough (Gallwey 1939).

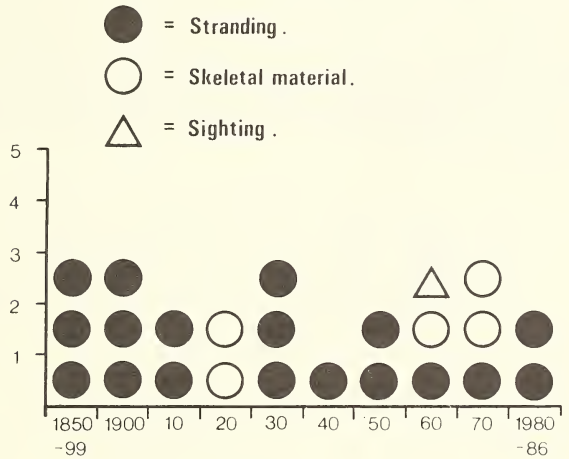

FIGURE 2
Frequency of records 1850–1986 in Yorkshire waters

Analysis of Yorkshire Records

The following analysis is based on data reviewed in Spalding (1966) and Delany (1985) with additional records from Clegg (1967), Massey (1977, 1979) and this study.

The minke whale is easily the most frequently recorded baleen whale in the North Sea, with strandings on the English coastline occurring as far south as Norfolk and into the English Channel as far as Plymouth (Evans 1980).

In Yorkshire waters there are records of one off-shore sighting, 18 strandings and on five occasions skeletal material has been washed ashore or trawled from the sea bed. Localities are shown in Fig. 1 and details of records tabulated in Appendix 1.

Fig. 2 and Appendix 1 show that recorded occurrences have remained reasonably constant since the mid nineteenth century. Fig. 3, based on size data of stranded

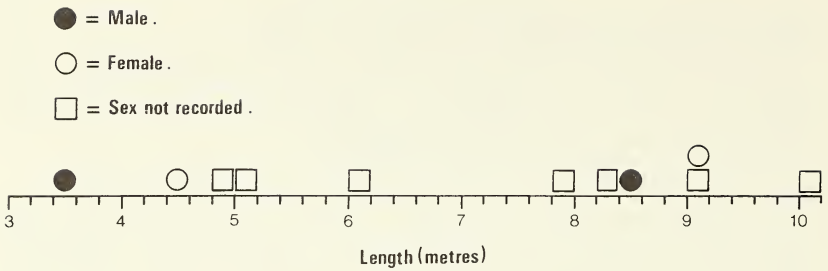

FIGURE 3
Size range of specimens stranded in Yorkshire waters

specimens, shows that there have been five immatures or sub-adults ranging from 12 (3.6 m) to 20 ft (6 m) and six adults from 26 (7.9 m) to 33 ft (10 m) in length. Although strandings have occurred throughout the year, Fig. 4 shows that most take place in autumn, particularly September. Massey (1972) attributes this seasonality to specimens going astray during their southerly autumn migration, though Evans (1980) suggests that some strandings may be the results of casualties and the separation of family groups due to the activities of the Norwegian whaling industry in the northern North Sea.

The winter and spring examples may provide evidence of animals remaining in northern latitudes throughout the year.

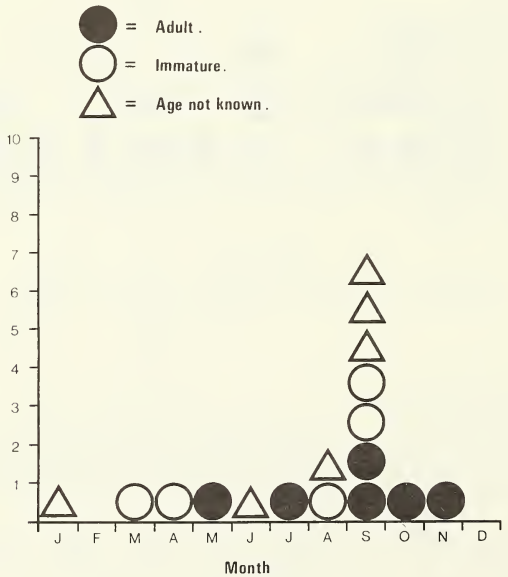

FIGURE 4
Seasonality of strandings and sightings in Yorkshire waters

Acknowledgements

Thanks are due to M. C. Sheldrick of the British Museum (Nat. Hist.) for clarification of recent records, to Miss A. Gowland, Messrs M. Limbert and J. Porter for locating press reports and Doncaster Museums and Arts Service for clerical support and access to literature.

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Appendix 1

Chronological list of *Balaenoptera acutorostrata* in Yorkshire waters

(Numbers refer to localities indicated in Fig. 1)

1.	Spring 1859	Sewerby (TA/2068) 16–17 ft specimen stranded (Spalding 1966).
2.	9.9.1869	Victoria Dock, Hull (TA/1228) (Spalding 1966).
3.	1873	Humber (Spalding 1966).
4.	–.1.1902	River Ouse near Swinefleet (SE/7621). Specimen stranded (Spalding 1966).
5.	15.8.1905	Spurn (TA/4014). 20 ft specimen stranded on Humber mud (Spalding 1966).
6.	–.11.1907	Scalby Ness (TA/0391). 30 ft female carrying foetus stranded (Spalding 1966).
7.	6.9.1913	Tunstall (TA/3132). 27 ft specimen stranded (Spalding 1966).
8.	21.10.1915	Ulrome (TA/1757). 33 ft specimen stranded (Spalding 1966).
9.	Early 1923	Yorkshire coast. Skull dredged from sea bed (Spalding 1966).
10.	–.10.1923	50 miles off Scarborough. Baleen plate trawled from sea bed (Spalding 1966).
11.	12.5.1936	Saltwick (NZ/9111). 28 ft specimen stranded (Spalding 1966).
12.	17.9.1938	Gainsborough (SK/8090). 15 ft 9 in specimen ascended the Humber and was killed in the Trent (Spalding 1966).
13.	22.3.1939	Flamborough (TA/2570). 12 ft male became stranded for six hours (Spalding 1966).
14.	2.9.1945	Withernsea (TA/3328). 30 ft specimen stranded (Spalding 1966).
15.	15.8.1953	Spurn (TA/4112). Specimen stranded (Delany 1985).
16.	20.6.1957	Runswick Bay (NZ/8115). Specimen stranded (Delany 1985).
17.	Late 1960	North of Kilnsea (TA/4117). Specimen stranded (Spalding 1966).
18.	1962	10 miles off Flamborough. Skull trawled from sea bed (Spalding 1966).

19.	18.9.1966	9 miles off Scarborough. Specimen seen from boat (Clegg 1967).
20.	19.9.1971	Black Nab, Saltwick Bay (NZ/9110). 14 ft 9 in female stranded (Massey 1972).
21.	3.3.1977	Hayburn Wyke (TA/0197). Eight vertebrae washed ashore (Massey 1977).
22.	14.1.1979	South Bay, Scarborough (TA/0487). Part of skull washed ashore (Massey 1979).
23.	13.7.1982	Hilston (TA/3033). 26 ft specimen stranded (this study).
24.	29.4.1985	Broomfleet Island (SE/8826). 17 ft specimen stranded after temporarily stranding in the Trent at Burton-on-Stather (SE/8618) and the Ouse at Goole Fields (SE/7521) (this study).

BOOK REVIEW

The Moths and Butterflies of Great Britain and Ireland. Volume 1, Micropterigidae to Heliozelidae, edited by **John Heath**. Pp. 344, with 9 monochrome and 4 colour plates, and 85 text figures. Volume 9, Sphingidae to Noctuidae (Noctuinae and Hadeninae). Pp. 320 with 16 colour plates and 19 text figures; Volume 10, Noctuidae (Cucullinae to Hypeninae) and Agaristidae, edited by **John Heath** and **A. Maitland Emmet**. Pp. 460 with 13 colour plates and 19 text figures. Harley Books, Colchester, Essex. £24.95 per volume.

The above three volumes in the continuing series eventually intended to cover the whole of the British lepidoptera have now been produced in a 'paperback' edition with laminated covers. Originally produced only in a hardback edition (Volume 1 in 1976 by Blackwell Scientific Publications and Curwen Press, Volume 9 in 1979 by Curwen Books and Volume 10 in 1983 by the present publisher), the series, originally due for completion in 1982, has fallen considerably behind schedule; inflationary trends meanwhile have resulted in a considerable price rise for each new volume, the latest (Volume 2), not available in paperback, being £47.50. These paperback editions all appear under the banner of the present publisher of the series, Harley Books, and except for a supplementary 'Preface to Paperback Edition' on page 10 of Volume 1 are identical with the original editions.

Volume 1 begins with introductory chapters on morphology, parasites, diseases of lepidoptera, pest species, habitats and conservation, study techniques and a bibliography of county faunal lists and other publications useful for the study of British lepidoptera. These prepare the ground for the systematic part of the volume which deals with the primitive Micropterigidae, the Eriocraniidae, Hepialidae, Nepticulidae, Opostegidae, Tischeriidae, Incurvariidae and Heliozelidae. The treatment of the species is comprehensive, Emmet's handling of Nepticulidae being outstanding, and includes keys to species and where appropriate the larval mines, descriptions of the moths, details of every stage of the life-histories where known and distribution. For the 'macrolepidoptera' dot distribution maps show presence on a 10 km square basis while those for the smaller species are shown by vice-county.

Volumes 9 and 10 cover the families Sphingidae, Notodontidae, Lymantriidae, Arctiidae, Nolidae, Noctuidae and Agaristidae. These volumes have previously been reviewed in this journal, Volume 9 in 1980 (*Naturalist* **105**:56) and Volume 10 in 1984 (*ibid* **109**:121). The colour plates in all three volumes are reproduced from paintings by Brian Hargreaves; these are generally less than satisfactory and compare unfavourably with the photographic reproductions in Goater's *British Pyralid Moths* by the same publisher.

This series will undeniably remain the standard work on the British lepidoptera for a very long time. The appearance of these three volumes in paperback at a saving of around 40 per cent of the cost of the hardback editions is very welcome, particularly to the amateur field lepidopterist.

HEB

OBSERVATIONS ON SOME FUNGI FROM THE SHIBDEN VALLEY CLAY MINE, HALIFAX

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Introduction

During a visit on 18 January 1983 to Springfield No. 2 clay mine in the Shibden Valley, Halifax, several fungi were collected during an inspection of a number of underground tunnels (Fig. 1).

Extraction of clay at Springfield No. 2 mine on the south-western slope of the Valley began in September 1969. Its predecessor, Springfield No. 1, on the facing slope, operated from 1948 to 1971, the first mine in the Valley devoted entirely to obtaining clay. Once 'roadways' or 'gates' into the mine have been dug, work proceeds by propping up the strata above the clay (i.e. ganister, a hard, highly siliceous stone layer, and the Halifax Hard Bed coal immediately above (see Wray *et al.* 1930)) with posts or beams, mainly of British or Scandinavian pine. When work in a tunnel is completed, the props are removed and the roof in that section allowed to collapse. Tunnel height varies from 4′6″ to 3′.

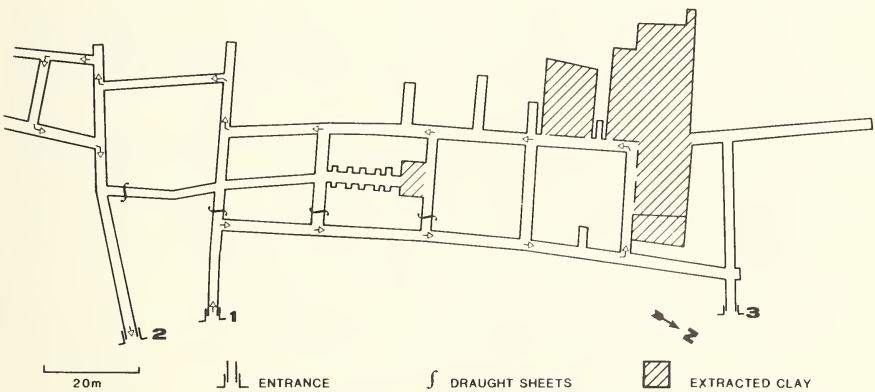

FIGURE 1
Plan of underground tunnels, Springfield No. 2 clay mine, indicating route followed for the investigation of fungi

Ventilation through the mine is by the main 'roadway' leading from the entrance, and the temperature within the mine throughout the year is 18(±2)°C. Light reaches the inner parts of the mine only from miners' helmet lamps. Gas accumulation has never been a problem at Springfield No. 2. Many stretches of the mine are dripping or damp with seepage water, and ganister and other stone, wooden props and beams and metal rail-lines are much coated with wet clay, which along with the waterproof suiting and rubber gloves recommended for the visitor makes botanical collecting difficult.

Notes on the Fungi Collected

The first fungus seen, towards the top of an upright pine prop quite near the mine entrance, was the bracket, *Daedalea quercina*, common on worked wood in buildings and mines. Specimens of other fungi found growing on or in close association with posts or beams deeper within the mine and sometimes hanging in thick weblike festoons in abandoned or little-used side tunnels, were despatched to the Commonwealth Mycological Institute, Kew, on the day of collection, and proved with one exception to be hyphomycetes.

Staff at CMI commented (Report No. H140/83/YE1 *in litt.* 21.4.1983) as follows on the four collections sent:

Specimens nos. 3 and 4, Herbarium IMI nos. 275190b and 275191b

Mariannaea camptospora Samson

Specimen no. 4, Herbarium IMI no. 275191a

Oidiodendron tenuissimum (Peck) S. Hughes

By the time the specimen reached CMI the wood was already infested with nematodes, but the *Oidiodendron* could be readily seen as small dark pins with hyaline heads of spores in chains. This is a common saprophyte on rotten wood. Attempts to culture it were unsuccessful as the other species present (*Mariannaea camptospora*) outgrew the *Oidiodendron* on each attempt. The original specimen, by now in poor condition, was discarded but slides have been deposited in Herbarium IMI.

Specimen no. 2, Herbarium IMI no. 275189

(a) *Acremonium strictum* W. Gams, a common and widespread saprophyte. Discarded.

(b) *Sesquicillium* sp. It was not possible to identify this isolate to species level without further study and as the culture was suffering from the depredations of the mites which also came in on the specimen the wisest course was to discard it at this stage!

Specimen no. 1, Herbarium IMI no. 275188

There is little doubt that these structures are rhizomorphs of a basidiomycete, but the species is impossible to determine accurately. Dimensions of the hyphae are similar to those of rhizomorphs of *Armillaria mellea* (Vahl: Fr.) Kummer, but *A. mellea* normally shows a much sharper distinction between hyaline inner hyphae and strongly pigmented sheathing hyphae than does this specimen. Attempts to isolate from the material and to induce further development by incubating it in a damp chamber have failed.

Specimen no. 3, Herbarium IMI no. 275190a

Dactylaria lanosa Malla & W. Gams, an uncommon hyphomycete known from pine forest soils. Unfortunately this specimen was so overgrown by the *Mariannaea* that it was impossible to isolate it.

Further to the comment above identifying specimen no. 1 as rhizomorphs of a basidiomycete, it is interesting to note the record by W. G. Bramley (1985, p. 78) of a rhizomorphic anamorph of *Armillaria*, '230 m in from the entrance of an old and long disused ironstone mine'.

Conclusion

Much of the point of these records derives from the particularity of the habitat. Springfield No. 2 is the only working mine left in Calderdale and is run on almost the same lines as its nineteenth-century precursors in the West Riding. Most modern mines are, in contrast, well lit, mechanically ventilated and constructed using metal rather than wooden props, so that the range of habitats presented by Springfield will probably not exist within the space of another generation.

Acknowledgements

We are grateful to the Commonwealth Mycological Institute for permission to quote from

their report on our finds, to the owner of Springfield, Mr Henry Parkinson, for access to the mine, to Mr Raymond Shaw and the mining staff for their most helpful provision of facilities and information, and to Mr S. Davidson for preparing the figure.

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A NOTE ON CHIRONOMID MIDGES FROM THE NORTH YORK MOORS

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'Moorfield', Appleton-le-moors, York YO6 6TE

Despite being one of the larger dipterous families, the Chironomidae (non-biting midges) is also one of the most under-recorded. Similarly, little is known about their life-cycles or ecology. The following account lists several species encountered by the authors while engaged in fieldwork since 1983. Comments on the ecology and behaviour of some species are also included.

Bryophaenocladius vernalis Goetghebuer is a small blackish species the hypopygium of which has a narrow gonocoxite with a prominent lobe. We collected two mated pairs close to a road drainage ditch on 13 February 1983 on Appleton Common, near Pickering (SE7387). Unlike most other chironomid species *B. vernalis* appears not to resort to swarming as a prerequisite to mating, as both pairs were seen to couple on the surface of snow! On subsequent occasions however, large mating swarms of this species have in fact been observed; see McLachlan and Allen (1987) for further explanation of this phenomenon.

Cranston (1982) mentions that no *Bryophaenocladius* larvae have been found in aquatic ecosystems in Britain. Larvae of *B. vernalis* however have been found in drainage water and possess posterior parapods typical of other aquatic species. This species has previously only been recorded twice in Yorkshire, at Crag Wood and Pen-y-ghent both in VC64, hence this present report represents a new record for VC62.

On 29 August 1983 we collected 29 mated pairs of *Procladius crassinervis* Zetterstedt. This is a medium-sized, brown fly with a very pronounced scutum. *P. crassinervis* belongs to the sub-family Tanypodinae, the larvae of which are all predaceous.

On 7 June 1984 several specimens of the orthoclad midge, *Bryophaenocladius nitidicollis* Goetghebuer were collected from a denuded peat moor near Glaisdale (NZ7301). This very small midge is quite rare and has only been recorded twice in Britain before. Both records were made over 50 years ago by the renowned entomologist F. W. Edwards. The second record was made in 1930 at Pen-y-ghent, so this present report represents only the second record of this midge in Yorkshire and the first for VC62. Unlike its cogenor, *B. nitidicollis* is a terrestrial species, the larvae living in moist peat before eclosing in May/June to mate on the wing during the brief lulls which occur in between successive gusts of wind. Pupal exuviae and adult flies have been obtained from samples of peat containing larvae. However, attempts at getting adults to mate and oviposit have been unsuccessful.

A species found in association with *B. nitidicollis* on 2 June 1985 was *Smittia edwardsi* Goetghebuer. It is distinguished from other *Smittia* species by the obtuse anal lobe on its

wing. One other record of this species exists from the Doncaster area, therefore this too is a new record for VC62.

On 4 July 1984 several examples of *Smittia aterrima* Meigen and *Chironomus luridus* Strenzke were collected from gardens in Appleton-le-moors, Pickering (SE7387). The former were swarming over a privet hedge while the latter were swarming over a rain-butt (from which associated larvae were also collected). Although both species are thought to be widespread in Yorkshire, with records from VC61 and VC63, no records exist for VC62.

Whilst sampling substrate from a pond on Appleton Common on 16 August 1984 we collected two females and one male of the large midge species, *Camptochironomus tentans* Fab. This fly has a brown/green abdomen and yellowish thorax with black scutal stripes. In many texts, such as Coe (1950), *Chironomus plumosus* L. is cited as being the largest chironomid species, however, one of the *Camptochironomus tentans* females collected measured 11 mm from its head to the tip of its abdomen — a sizeable beast! Another female was found to be infested with the nemertine worm *Mermis*; the resulting morphological aberrations included unusually smaller cerci.

During an evening's sampling excursion on 29 May 1985 we collected six males of the ghostly-looking species, *Conchapelopia melanops* Meigen. This is a very pale, almost white tanypod midge. It was swarming at a height of about 2 m, just above a swarm of *B. vernalis* on Appleton Common. Previous records exist from the Leeds and Ilkley area but once again there are no known records for VC62.

We are grateful to P. Skidmore for providing information on chironomid records and Dr P. Langton for assistance with the identification of certain species.

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BOOK REVIEW

The Rivers of Britain by **Richard and Nina Muir**. Pp. 223, with numerous colour and black and white illustrations. Webb and Bower (Michael Joseph). 1986. £14.95.

Apart from the imprint of two publishing firms this book also carries the insignia of The National Trust. Add to these the names of the co-authors Richard and Nina Muir and you can be sure of a very good book.

The book caters for the widest possible range of river users and/or countryside sympathizers, and anybody who has anything to do with rivers on a regular basis should read it. As one who in recent years has been involved in the conservation controversies surrounding that superb river the Yorkshire Derwent, I galloped through the book looking for references to it. There were three listed in the index – I could only find two of them, but the main one was in the chapter on rivers in danger. So the index was at fault, but that is about the only criticism I can make.

The rest is a series of excellent reviews of British rivers, their creation, variety, development, use by man – including how to get across them via bridges, fords and ferries – and finally their conservation status, with the authors' thoughts on river management. The illustrations are many and varied; Richard Muir did most of the river photographs.

If you are thinking of a suitable present for a relative, friend, your favourite water authority official, an angler, naturalist, or country walker – or even yourself – I can recommend this book. Who knows, it might be the inspiration for a British Rivers Trust one day.

TMC

HABITAT RELATIONSHIPS OF MILLIPEDES FROM CHESHIRE

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Abstract

Millipedes were sampled from eight sites in Cheshire. The species caught have been examined in relation to their known distributions and the data used to group the habitats according to the species found in them. Two major groups were observed: woodlands and open and/or wet areas. Within these groups other habitat similarities were noted.

Introduction

Millipedes are common woodland arthropods, frequently being found in leaf litter, humus and under stones, logs and the bark of dead tree trunks and stumps. During an investigation into the surface-active Coleoptera of a number of sites in Cheshire (Wheater 1984) a large number of millipedes were also collected. This paper presents the data and attempts to define habitat types in relation to the species found.

Methods

Two areas in Cheshire, Abbot's Moss Hall, near Delamere Forest (SJ5968) and Tabley Hall, near Knutsford (SJ7276) were sampled from March to November 1981. Sampling was carried out using pitfall traps (9 cm diam × 13.5 cm deep); a grid of 15 traps placed at each site was examined at fortnightly intervals.

Abbot's Moss Hall

Four sites all on sandy soil: a dense coniferous woodland of Douglas fir *(Pseudotsuga menziesii)* (AC); a deciduous woodland mainly of pedunculate oak *(Quercus robur)* (AD); a marshy area adjacent to a pond (AM) and a mixed woodland of pedunculate oak and Douglas fir (AW).

Tabley Hall

Five sites all on clay: a grazed pasture (where no millipedes were found); a small copse of horse chestnut *(Aesculus hippocastanum)* next to a lake (TL); a very wet marshy area of bulrushes *(Scirpus lacustris)* (TM); a scrubby area of reeds *(Juncus)* and bramble *(Rubus)* (TS) and a deciduous woodland of beech *(Fagus sylvatica)* (TW). The species were identified and habitats compared using the Maximum Likelihood Index of Similarity. This index takes into account the presence and absence of species at the sites, and uses the total number of species found during the study. It also provides a measure of significance with similarities greater than 1.96 (or less than −1.96) being significant at the 5 per cent level (Cook 1978).

Results

Millipedes were collected from all but the grassland site, a total of 2281 individuals from 12 species (Table 1). These included representatives from four of the six British orders and comprised almost a quarter of the British species. The 12 species caught include the 11 commonest in Britain (Blower 1985) and a number of the most ubiquitous (e.g. *Tachypodoiulus niger, Polydesmus angustus*, and *Ophyiulus pilosus*). A dendrogram of similarity is presented in Fig. 1.

Discussion

All of the species collected have previously been recorded from the area and the habitat preferences found during the study are similar to those given by Blower (1985). The higher numbers of the less vagile species such as *Ophyiulus pilosus* and *Julus scandinavius* may indicate that even higher densities of such species are present than are apparent at

TABLE 1
Species list

Species	Sites							
	AC	AD	AM	AW	TL	TM	TS	TW
Glomeris marginata (Villers)							4	
Nanogona polydesmoides (Leach)		1						3
Proteroiulus fuscus (Am Stein)	1	1		1			2	91
Ommatoiulus sabulosus (Linne)				2				
Tachypodoiulus niger (Leach)	1	16		2			27	49
Cylindroiulus punctatus (Leach)	1	14		7			20	164
Cylindroiulus britannicus (Verhoeff)								2
Julus scandinavius Latzel	4	6	24	89		1	29	400
Ophyiulus pilosus (Newport)	1	4	6	53			15	199
Polydesmus angustus Latzel	45	86	39	217	21	1	69	537
Polydesmus denticulatus Koch					1		1	18
Brachydesmus superus Latzel		2		1			1	2

Key

Abbot's Moss Hall
AC . . . coniferous woodland
AD . . . deciduous woodland
AM . . . marshy site
AW . . . mixed woodland

Tabley Hall
TL . . . lakeside woodland
TM . . . marshy site
TS . . . scrubby site
TW . . . deciduous woodland

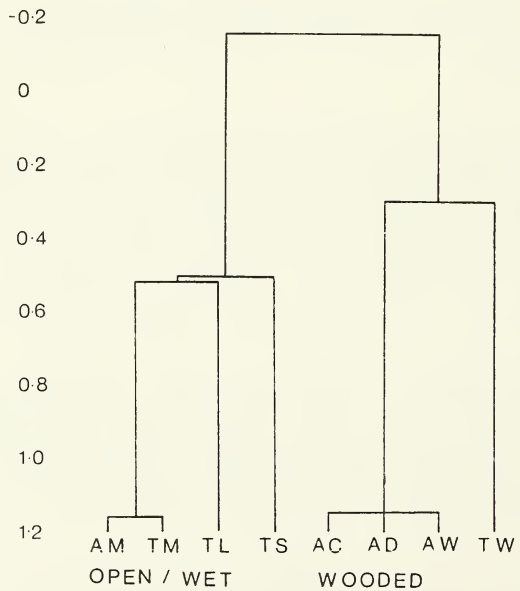

FIGURE 1
Dendrogram of site similarities using the Maximum Likelihood Index.
The site names are as in Table 1.

first sight. Pitfall trap captures reflect the abundance and activity of the animals caught, and more vagile species (e.g. *Tachypodoiulus niger*) may be more heavily represented than less active species.

J. scandinavius was the most frequently captured of the Julini, although *O. pilosus* is usually the dominant species (Blower 1985). However, Blower (*pers. comm.*) has suggested that *J. scandinavius* may be commoner in the north of Britain. The high captures of *Cylindroiulus punctatus* and *Proteroiulus fuscus* in the deciduous woodland at Tabley Hall may be due to the microhabitat requirements of these species. This is an unmanaged woodland and as a consequence rotting wood is abundant. Both of the species are common under the bark of such wood.

Despite the collections containing many common and some eurytopic species (e.g. *Ommatoiulus sabulosus* and *T. niger*) the presence and absence of those found can be seen to separate the sites into a number of habitat types. Although none of the similarities are significant (all lying between −1.96 and 1.96) certain patterns can be noted. As can be seen from the dendrogram (Fig. 1) the sites can be divided into two main groups. These are open and/or wet areas and woodlands. Within the first group the areas of marsh form a smaller group with the lakeside copse and the scrubby area being less similar. In the woodland group the woodlands on sandy soil are grouped together at a much higher similarity than is the woodland on clay soil. These results seem to indicate that even in the absence of indicator species for wet or open areas (all of the species were common woodland animals) habitat separation is still possible. This is probably due to the absence from open sites of some of the species.

Acknowledgements

We would like to thank Professor D. M. Guthrie for granting facilities in the Zoology Department at Manchester University, Mr J. G. Blower for reading and commenting on the manuscript, Mr and Mrs Hamilton for permission to work at Abbot's Moss Hall, and the University of Manchester Estates Office for permission to work on their lands at Tabley Hall and all our friends and colleagues who assisted with the field work.

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BOOK REVIEWS

Otters: Ecology and Conservation by **C. F. Mason** and **S. M. Macdonald**. Pp. 236, including numerous black and white photographs, line drawings, maps, graphs and tables. Cambridge University Press. 1986. £15.00.

The otter, at the top of its particular food chain, is a vulnerable animal in a vulnerable habitat and can be used as an indication of a healthy environment, a good otter population reflecting a properly functioning aquatic eco-system.

This important book describes how otters have decreased substantially in numbers and range during the present century through the combined effects of water pollution, habitat destruction, disturbance and direct persecution.

Since the realization that all was not well with the Eurasian otter population, a wave of research projects and surveys have been undertaken, providing an enormous international corpus of data relating to distributional history, rates of decline, feeding and breeding biology, ecology, habitat requirements and conservation. Mason and Macdonald have compiled a masterly and most readable review, making full and imaginative use of this

newly available knowledge, including much original work undertaken by the authors themselves.

For students of environmental sciences, from GCSE to MSc level, the book provides an analysis of numerous case studies illustrating the effects on eco-systems of land use changes and land management strategies. It should therefore be on the library shelves of every senior school, college and university.

Hardly any aspect of modern life remains unscathed by this multi-disciplinary study, be it the use of toxic chemicals and fertilizers and the ploughing of upland pastures by the farming industry, massive coniferous afforestation by the forestry industry, acidification of water through our burning of fossil fuels, clinical management of rivers and other watercourses by the water industry and disturbance of aquatic habitats by the leisure industry.

The star performers in this engrossing work may be the world's nine species of otter, of interest chiefly to mammalogists, but the examples given and lessons learned have repercussions for all branches of wildlife studies.

So important are the environmental issues, and so clearly and concisely are they presented and discussed, that Mason and Macdonald's *Otters: Ecology and Conservation* would be a useful reference work for the staffs and governors of water boards, the MAFF and planning authorities.

CAH

Identifying Animal Tracks by **Richard Headstrom**. Pp. 141, with many line drawings. Dover Publications. 1986. £2.50.

Since this small pocket guide deals exclusively with the eastern United States, it will probably be of limited appeal to British naturalists. However, if you are an animal track enthusiast, or are planning a trip to the USA, you will find the book interesting and a good inexpensive introduction to tracking and trailing in North America.

Unlike similar books of this type, *Identifying Animal Tracks* is not only concerned with mammals: birds, reptiles and even amphibians get a mention.

JKS

Practical Deer-stalking. A Constable Guide by **G. Kenneth Whitehead**. Pp. 184, with numerous black and white photographs, line drawings and diagrams. Constable. 1986. £9.95.

With its emphasis on firearms and techniques of butchery, this is perhaps a strange book to review in the pages of *The Naturalist*. However, as a practical guide it contains sections, particularly those on stalking and fieldcraft, potentially useful for naturalists interested in deer watching or indeed watching any large mammal in the field.

Techniques for ageing carcases based on tooth wear characteristics are clearly illustrated and provide a useful guide for those lucky enough to come across skeletal material, road casualties, etc. Guidance on the preparation and mounting of trophies enables this material to be properly conserved and presented.

A clear outline of the annual cycles of reproduction and antler growth is given for each British species and is of use if planning fieldwork or excursions to deer parks. The legislation covering close seasons, use of firearms and ammunition for the various species in Great Britain and Ireland is reviewed in a simple and clear digest.

CAH

The Dragonflies of Great Britain and Ireland by **Cyril O. Hammond**. 2nd edition, revised by **Robert Merritt**. Pp. 116, with 20 colour plates, 23 figures and 44 maps. Harley Books, Great Horkesley, Essex. 1985. £9.75 paperback.

A postscript to the preface notes the rediscovery of *Lestes dryas* in Essex, Norfolk and Kent and further locations in Ireland for *Coenagrion lunulatum*; otherwise this appears to be a straightforward reprint, likely to attract some who would baulk at the price of the hardback edition.

JHF

THE PAST AND PRESENT OCCURRENCE OF THE MOSS *ANOMODON LONGIFOLIUS* IN THE NORTH OF ENGLAND

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Anomodon longifolius was first collected in the north of England by J. G. Baker on the banks of the River Tees near Egglestone Abbey in 1856, and the record duly appears in his *Flora of North Yorkshire* (Baker 1906). A few years later, in 1861, it was collected in small quantity on Ingleborough by John Nowell but the record was never published until the specimens were discovered a few years ago in the British Museum. Later in the century four new localities were reported by Richard Barnes in Teesdale, Swaledale and Wensleydale (Barnes 1890, 1897) and the plant was evidently not very rare in these Dales at that time. It was last seen, apparently, during the YNU excursion to Wensleydale in 1905 and has not been seen since. Full details of these early records are given in Appendix 1.

A similar pattern of decline is apparent elsewhere in Britain. *A. longifolius* is recorded from the Wye Valley in Hereford, Monmouth and Gloucester, and from limestone near Wells in Somerset, but it possibly survives now only in Gloucester. In Scotland it is known from the Den of Airlie in Angus and from calcareous schists in Perthshire but may be extinct in the former locality. The species therefore may survive in only two of the nine British vice-counties from which it has previously been recorded.

During a visit to Anston Stones Wood in South Yorkshire (VC 63) in February 1986, I noticed a small population of a slender wiry moss which had the habit of *A. longifolius*, and microscopic examination confirmed that this was indeed the case. The habitat was on the face of a large shaded boulder of Magnesian Limestone and associated species included *Neckera complanata* and *Anomodon viticulosus*. Anston Stones Wood is noted as one of the most important bryological sites in South-west Yorkshire (VC 63) with a flora which includes *Marchesinia mackaii*, *Cololejeunea rosettiana* and *Amblystegium compactum*, but the occurrence there of *A. longifolius* is none the less remarkable. The causes of the decline of this species in Britain are obscure. Collecting may have been a factor in the Wye valley but this can hardly have been the case in North Yorkshire, from where I have seen only a few herbarium specimens. The new locality, which is close to the mining and industrial areas of South Yorkshire, suggests that atmospheric pollution may also not be a factor of significance. Although a brief visit to Egglestone Abbey in June 1986 failed to reveal the species, it is difficult to believe that it has entirely disappeared from the northern Dales.

There remains one small mystery in connection with *A. longifolius* and its occurrence in Teesdale. One of the surviving specimens of Baker's 1856 gathering (preserved in CMM) is actually *Anomodon attenuatus*. This latter species has been recorded in Britain only from Perthshire and Angus and it is believed extinct in both counties. Teesdale would therefore represent a large extension of its British range and since all the BM material from Egglestone Abbey is *A. longifolius*, some doubt must attach to the provenance of the Bradford specimen. Both species however are recorded from the Den of Airlie in Angus and the possibility that they occurred together in Teesdale cannot be entirely dismissed.

Acknowledgements

I wish to thank Miss M. M. Hartley (Cliffe Castle, Keighley) for the loan of specimens, and the Curator of the Herbarium at the British Museum for the loan of a wide range of British material of both *A. longifolius* and *A. attenuatus*.

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Appendix I

Early records of *Anomodon longifolius* in the north of England

1. Ingleborough (VC 64). The only record was made by John Nowell, 6 June 1861. The record was not published at the time. Specimens are preserved in Herb. H. H. Wood, Herb. Hunt and Herb. Braithwaite [**BM**]. The specimens are annotated 'on the ledge of a limestone rock on Ingleborough' and 'found only one small patch'.
2. River Tees near Egglestone Abbey, Teesdale (VC 65). The first record was made by J. G. Baker in 1856 and was published as follows: 'On rocks by the side of the Tees near Egglestone Abbey, where the main limestone issues from beneath the millstone grit' (Baker, 1906). There are specimens in Herb. Wilson (dated June 1856), Herb. Hunt (dated May 1856) and Herb. Braithwaite [**BM**]. The plant was refound in the same or an adjacent locality by R. Barnes and M. Slater during the YNU Excursion to Rokeby in 1892 (Waite, 1892).
3. Richmond, Swaledale (VC 65). The only record was made by R. Barnes in December 1888 and published shortly afterwards (Barnes, 1890). There are specimens in Herb. West and Herb. Braithwaite [**BM**].
4. Keld, Swaledale (VC 65). The only record was made by R. Barnes in October 1889 (Barnes, 1890). No specimen traced.
5. Askrigg, Wensleydale (VC 65). The first record was made by R. Barnes between 1893 and 1897 (Barnes, 1897) and the plant was refound by W. Ingham during the YNU Excursion to Aysgarth in 1905 (Ingham, 1905). No specimen traced.
6. Winston Bridge, Teesdale (VC 66). The only record was made by R. Barnes in December 1887. The published record (Barnes, 1890) specifically refers to the Durham side of the Tees. A specimen in Herb. Braithwaite [**BM**] localized simply as 'Winston' presumably belongs to this gathering.

BOOK REVIEW

Birdlife: Insights into the Daily Lives of Birds by **Jim Flegg**. Pp. 176, with black and white sketches. Pelham Books. 1986. £12.95.

Using examples from around the world, this book covers a wide range of ornithological topics, ranging from the origin of birds to migration and from feeding techniques to breeding biology. As the publishers claim, it is easy to read and the bordered format of the pages with sketches incorporated into the text is quite attractive.

Unfortunately however most of the subjects are treated very superficially. The experienced ornithologist will find little new information here and the beginner will get a very incomplete picture of birds' life-styles. For example, when discussing the ways in which bee-eaters deal with stinging hymenoptera no mention is made of the very interesting devenoming behaviour. Further, the statement that bee-eaters are 'as susceptible to bee stings as any other bird or mammal' would be challenged by some authorities.

Scientific names are not included, which is unfortunate especially when there are mistakes in the common name; for example, the great black-backed gull is referred to on page 37 as 'great backed gull' and twice, including the index entry, as 'greater black-backed gull'. Another omission is the lack of any bibliography, making it difficult, especially for the beginner, to follow up topics of interest.

A disappointing book which at £12.95 is rather poor value.

JKS

BOTANICAL REPORT FOR 1985

FLOWERING PLANTS AND FERNS

All the Recorders thank members who have contributed to these reports. They have selected from the lists received those records of species which add to the information on distribution within the vice-counties.

The names of contributors are given the first time they appear in each vice-county report and thereafter initials are used. The figures indicate 10 km grid references.

† new county record * new vice-county record

East Yorkshire (VC 61) (F. E. Crackles)

A 10 km square reference indicates a first record for the square.

Hypericum maculatum × *H. perforatum* = *H.* × *desetangsii* Lamotte Kilnsea Warren 54/41, 1984; J. R. Comley and M. Nicholls.

Hypericum montanum L. Disused railway, Wharram 44/86; E.C.

Minuartia hybrida (Vill.) Schischk. Disused railway, Kipling Cotes 44/94; D. R. Grant.

Potamogeton berchtoldii Fieb. Village pond, N. Dalton 44/95; D.R.G.

†*Juncus ambiguus* Guss. Northern part of Spurn 54/41 and in the Kilnsea Beacon area 54/41; F. E. Crackles and M. N. Barmston 54/15; E.C.

Platanthera chlorantha (Custer) Reichb. Near Butterwick 44/97; B. Pashby.

Dactylorhiza purpurella (T. and T. A. Stephenson) Soó, form B Steph. Over 900 plants, Victoria Dock, Hull; J. Giblin and F.E.C.

Acorus calamus L. One plant, Skipwith Common 44/63; E.C.

Scirpus tabernaemontani C.C. Gmel. Near Riccall 44/63; J. Lambert.

**Festuca pratensis* × *Lolium multiflorum* = × *Festulolium loliaceum* (Huds.) P. Fourn. Near Firby 44/76; E.C., det. T. A. Cope.

North-east Yorkshire (VC 62) (T. F. Medd)

Crambe maritima Scop. Redcar 45/62; M. Yates (confirmation of pre-1930 record).

Saponaria officinalis L. Tollerton 44/56; Miss J. E. Dinwiddie.

Stellaria neglecta Weihe Castle Levington 45/41; I. C. Lawrence.

Ribes spicatum Robson Cropton 44/78; YNU Excn.

Epilobium roseum Schreb. Marton 45/51; I.C.L.

Parietaria judaica L. Saltburn 45/62; I.C.L.

Ulmus plotii Druce Cornelian Bay, Scarborough 54/08 and Scalby 54/09; R. and M. Gulliver.

Anagallis tenella (L.) L. Guisborough 45/61; I.C.L.

Utricularia vulgaris L. Tollerton 44/56; J.E.D.

Senecio sylvaticus L. Danby 45/70 and Hawsker 45/90; R. and M. G.

Gymnadenia conopsea ssp. *densiflora* (Wahlenb.) G. Camus, Bergon and A. Camus. Skinningrove and Hummersea Cliffs 45/71 and 72; I.C.L.

Dactylorhiza traunsteineri (Sauter) Soó Harwood Dale 44/99; J. H. Bolton and F. Horsman det. D. J. Tennant.

**D.* × *jenensis* (Brand.) Soó *(D. maculata* × *traunsteineri)* Near Pickering 44/88; M. Foley conf. R. H. Roberts. Second English record.

Anacamptis pyramidalis (L.) Rich. Skinningrove 45/72; I.C.L.

Carex × *pseudoaxillaris* K. Richt. *(C. otrubae* × *remota)* Norton 44/76; Dr M. B. Usher.

South-west Yorkshire (VC 63) (D. R. Grant)

Equisetum sylvaticum L. Oakwell Hall, Birstall 44/22; E. Thompson.

Ophioglossum vulgatum L. Kettlethorpe, Wakefield 44/31; E.T.

Asplenium adiantum-nigrum L. Wall, Chellow Dean Reservoir, Bradford 44/13; G. Barker.
A. trichomanes L. Slaithwaite 44/01; B. and J. Lucas.
Ceterach officinarum DC. With *A. adiantum-nigrum*; G.B.
Ranunculus omiophyllus Ten. (*R. lenormandii* F. W. Schultz.) Cullingworth 44/03; T. Schofield.
R. hederaceus L. Buck Mill, Thackley 44/13; Bradford Naturalists' Society Excn.
Ceratophyllum demersum L. Denaby Ings Nature Reserve 44/40; D. Bramley.
Chelidonium majus L. Carleton 34/94; D. R. Grant.
Saponaria officinalis L. Old railway, Felkirk, Wakefield 44/31; E.T.
Cerastium arvense L. Roadside, Heath Common, Wakefield 44/31; C. Hartley.
Cardaria draba (L.) Desv. Normanton 44/32; D.R.G.
Hypericum humifusum L. Thrybergh 43/49; YNU Excn.
H. montanum L. Fryston Wood, Castleford 44/42; T.S.
Geranium sylvaticum L. Old railway, Earby 34/94; D.R.G.
Genista anglica L. On the county border at Salterforth 34/84; M. and W. Yewdall; Denaby Ings Nature Reserve 44/40; D.B.
Crataegus laevigata (Poiret) DC. *(C. oxyacanthoides* Thuill.*)* Near Hellaby 43/59; R. Smith.
Anthriscus caucalis Bieb. Near Cantley 44/60; D.B.
Oenanthe crocata L. Hoyle Mill, Barnsley 44/30; J. Lunn.
Silaum silaus (L.) Schinz & Thell. Firsby Reservoir 43/49; YNU Excn.
Bryonia dioica Jacq. Near Hatfield Woodhouse 44/60; D.R.G. Kilnhurst Bridge 43/49; J. Stone.
Humulus lupulus L. Near Woolley Edge, Wakefield 44/31; D.R.G.
Populus canescens (Ait.) Sm. Roadside A614, Torne Bridge 44/60; E.T.
Lysimachia vulgaris L. Buck Mill, Thackley 44/13; BNS Excn.
Ligustrum vulgare L. Fryston Wood, Castleford 44/42; T.S.
Blackstonia perfoliata (L.) Huds. Fryston Wood, Castleford 44/42; T.S.
Scrophularia umbrosa Dumort. Lothersdale 34/94; D.R.G.
Crepis paludosa (L.) Moench Near Thornton-in-Craven 34/94; D.R.G.
Baldellia ranunculoides (L.) Parl. Torne Bridge, near Blaxton 44/60; D.R.G.
Juncus subnodulosus Schrank Torne Bridge, near Blaxton 44/60; E.T.
Epipactis phyllanthes G.E.Sm. Fryston Wood, Castleford 44/42; S. King.
Typha angustifolia L. Kirkthorpe, Wakefield 44/32; E.T.
Carex pseudocyperus L. Drain near Cantley 44/60; D.R.G.
C. pallescens L. Lothersdale 34/94; D.R.G.
C. otrubae Podp. Stanley Nature Reserve, Wakefield 44/32; E.T.
C. spicata Huds. Firsby Reservoir, Ravenfield 43/49; YNU Excn.
Glyceria plicata Fr. Thrybergh Reservoir 43/49; YNU Excn.
G. maxima (Hartm.) Holmberg Near Oldfield 44/03; D.R.G.
Festuca arundinacea Schreb. Near Walden Stubbs 44/51; E.T.
Vulpia myuros (L.) C.G.Gmel. Thrybergh tip area 44/49; YNU Excn.
Puccinellia distans (L.) Parl. Near Almholme, Doncaster 44/50; E.T.
Bromus erectus Huds. Scawsby 44/50; E.T.
Aira praecox L. Near Carleton 34/94; D.R.G. Near Cullingworth 44/03; E.T.
Apera spica-venti (L.) Beauv. Near Kilnhurst Bridge 43/49; YNU Excn.

Mid-west Yorkshire (VC 64) (L. Magee)

The list from D. R. Grant is very comprehensive and includes interesting species found during YNU excursions. Of special interest is the discovery of a large number of plants of *Actaea spicata* from Huddlestone Wood.

+ not recorded for 10 km grid square in Plant Atlas.

+*Equisetum telmateia* Ehrh. Near Foxup 34/87; Wharfedale Naturalists' Society Bot. Sec. Excn. per Mrs J. E. Duncan.
Actaea spicata L. 70 plants, Huddlestone Wood 44/33; A. Pearson.
Silene noctiflora L. Near Huddlestone Wood 44/33; A.P.
+*Cerastium glomeratum* Thuill. Near Foxup 34/87; W.N.S.
Malva moschata L. White-flowered form, Grass Wood 34/96; Mrs F. C. Draper.
+*Rubus chamaemorus* L. Birks Tarn 34/97; Mrs A. M. Gramshaw.
Oenanthe fistulosa L. Farnham Mires 33/60; D. R. Grant.
Silaum silaus (L.) Schinz and Thell. Appleton Roebuck 44/54; D.R.G.
+*Populus tremula* L. Near Foxup 34/87; W.N.S.
Pyrola minor L. Mickley 44/27; D.R.G.
Menyanthes trifoliata L. In 10 km square 44/85; D.R.G.
Scrophularia umbrosa Dumort. Near Wetherby 44/34; D.R.G.
+*Mentha spicata* L. Near Addingham 44/04; J.E.D.
Littorella uniflora (L.) Aschers. Eccup Reservoir 44/24; L. Magee.
+*Viburnum opulus* L. Near Foxup 34/87; W.N.S.
+*Cirsium heterophyllum* (L.) Hill Near Addingham 44/04; J.E.D.
+*Triglochin palustris* L. Near Foxup 34/87; W.N.S.
+*Juncus bufonius* L. Near Foxup 34/87; W.N.S.
+*J. acutiflorus* Ehrh. ex Hoffm. Near Foxup 34/87; W.N.S.
+*Eleocharis quinqueflora* (F. X. Hartmann) Schwarz Near Foxup 34/87; W.N.S.
Carex vesicaria L. Buckden 34/97; L.M.
+*Glyceria declinata* Bréb. Near Foxup 34/87; W.N.S.
Hordeum secalinum Schreb. Appleton Roebuck 44/54; D.R.G.
Calamagrostis canescens (Weber) Roth Stub Wood 44/54; and Lindley Wood 44/24; D.R.G.

North Yorkshire (VC 65) (T. F. Medd)
Allium oleraceum L. Aysgarth 44/08; D. R. Grant.
Hammarbya paludosa (L.) Kuntze Near Sedbergh 34/69; F. Horsman and A. Stoddard (1983 confirmation of 1938 record (*Nat.* 1938, 291)); on the Yorkshire side of River Tees between High Force and Cronkley 35/82; F.H. (confirmation of 1940 record (*Nat.* 1940, 252) by Dr W. A. Sledge).
Festuca arundinacea Schreb. Aysgarth 44/08; D.R.G.

Casuals and Adventives (E. Chicken)
For this year's report 82 records have been received from nine people concerning 47 species, a considerable decrease in the number of species compared with last year.

Mr J. Martin sent in a list of 32 records mostly from fields treated with shoddy. The majority of these have been reported in recent years from the same area and are not listed below. Mr D. R. Grant sends 31 records of established aliens such as *Reynoutria japonica* and *Symphoricarpos rivularis* and these also are entered in the card index, but are not listed here. Most intriguing of the native plants is the sterile *Circaea* × *intermedia*, a plant mainly of hilly areas in the west and north of the British Isles, now found in woodland formerly part of the Boynton estate near Bridlington.

A selection of plants is given, determination being by the finder unless otherwise stated.

Azolla filiculoides Lam. Pond, Osgodby 44/73; E. Chicken.
Corrigiola litoralis L. Disused railway, near S. Cave 44/93; A. and H. Peacock.
Sisymbrium loeselii L. (63) Field with shoddy, Mickletown 44/42; 1984, J. Martin.
Galega officinalis L. (63) Hillside by canal, Milnsbridge 44/11; Mrs J. Lucas.
Coronilla varia L. (63) Long Sandal, Doncaster 44/60; Mrs D. Bramley per D. R. Grant. Pildacre Hill, Ossett 44/22; C. Braham.

Cyperus longus L. Thorpe Marsh, Doncaster 44/60; D.B.

Ribes aureum Pursh (61) Old garden site, Kilnsea Warren 54/41; known to have been present some years; B. Pashby det. E. Chicken.

**Circaea* × *intermedia* Ehrh. (61) Woodland at Boynton 54/16; E.C. conf. P. Benoit.

Ammi majus L. (63) Field with shoddy, Rothwell 44/32; Mrs E. Bray det. E.C.

Foeniculum vulgare Mill. Near Thrybergh 43/49; YNU Excn. Lindholme 44/60; E.T.

Erinus alpinus L. Lothersdale Mill 34/94; D.R.G.

Centranthus ruber (L.) DC. Road cutting, M1 Motorway, Darton 44/30; D.R.G.

Lactuca serriola L. (61) New verge in central Hull 54/02; E.C.

Datura stramonium L. (64) Little Ribston near Wetherby 44/35; Dr R. Henson per Miss M. Sanderson.

Dasypyrum villosum (L.) P. Candargy (63) Waste near Rothwell 44/32; E.B. det. T. A. Cope.

Hordeum jubatum L. (63) Junction 22 of the M62, Moss Moor, altitude *c*380 m, 34/91; D. P. Earle per Dr W. A. Sledge.

Taeniatherum caput-medusae (L.) Nevski (63) Field with shoddy, Mickletown 44/42; J.M.

BOOK REVIEWS

Woodland Walks in the North of England by **Gerald Wilkinson**. Pp. 95, incl. over 100 full colour photographs and maps. Webb & Bower, in conjunction with Ordnance Survey. 1986. £5.95, paperback.

A better title for this book would be 'Woodlands with Walks' as it is a comprehensive catalogue of woodlands with only general information about the walks. There is precise information on the location of each woodland, backed up by excellent OS maps, and there are notes on the character of each, again complemented by good photographs. The tourist should have no difficulty in locating the woodlands in each of the 12 blocks into which the region is sub-divided, but should not look for much help from the index, which is patchy, giving, for example, 11 page references for ash, but none for oak, beech or birch. Overall a useful digest of information on woodlands that are worth visiting.

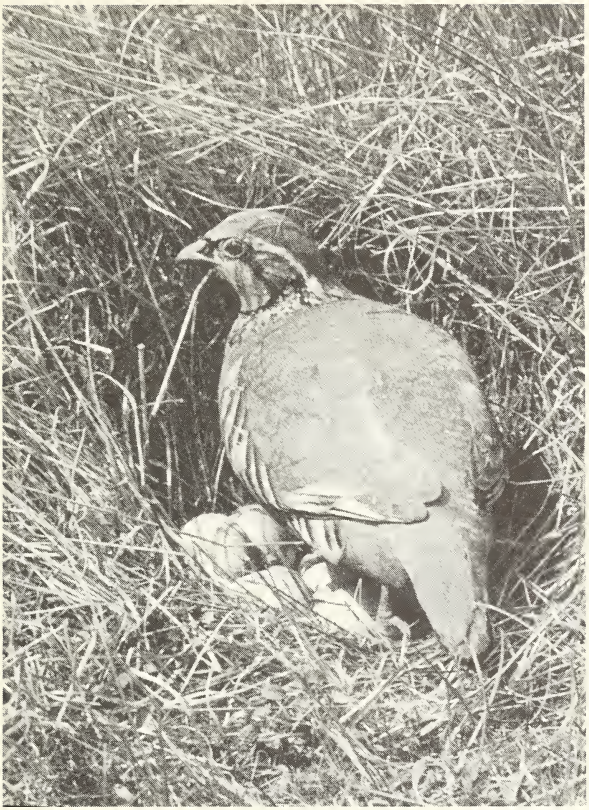
ARC

Wetland: Life in the Somerset Levels by **Patrick Sutherland** and **Adam Nicolson**. Michael Joseph. 1986. £12.95.

In recent years, naturalists and conservationists have become acutely aware of the conflicting pressures existing between maintenance of the wildlife wetland habitats of the Somerset Levels and demands of drainage for productive modern farming methods. Those potential readers who are looking for a book detailing the plants, animals and communities of this battleground will be disappointed. This book mentions but does not concentrate on wildlife in this man-made area. Instead it provides a fascinating account of the region from the standpoint of the other essential component of the ecosystem, namely the people who live there. Adam Nicolson's continuous text is a mixture of perceptive historical and biological summary and verbatim dialogue with the inhabitants. His thesis that 'Wetness is not a substance but a quality, the condition of life' is amply borne out by his consideration of such things as floods, eels, peat, prehistoric trackways, cider and basketry. His landscape lives. Even if you do not read the text, Patrick Sutherland's superb black and white photographs provide a visual summary and are worth every penny of the price. 'How' and 'why' the present conditions exist are clearly explained. The conservation problem is not avoided. As elsewhere in the book, the locals are allowed to speak, providing sensible comments on 'Sites of Special Scientific Excitement' and the need for protection of the 'Greater Crested Farmer and Lesser Spotted Drainage Engineer'. While no conclusions are forced on the reader, after reading this book it is impossible not to add the human element into the equation. This balanced book is a pleasure from cover to cover. Buy it and extend your horizons!

DHB

RED-LEGGED PARTRIDGE



Red-legged Partridge
Photo: Arthur Gilpin

Although attempts to introduce the Red-legged Partridge into this country began as early as 1673, it was not until 1790 that they were successful. In that year thousands of eggs were imported, and as many of them came from France, the bird became known as the Frenchman or French Partridge. The Red-legged Partridge is an exceptionally good runner, and it has been suggested that the first of those names was derived from the way the French soldiers reacted to Wellington's men in the Peninsular Wars. As this bird likes light soil and dry conditions it is not surprising that it became common in East Anglia, and in Yorkshire is most often seen in the East Riding. The present methods of farming do not seem to have affected the Red-legged as adversely as they have the native partridges and the former has much in its favour. Its chicks are easily reared in captivity so large numbers are released each year, and when young they require less insect food than do juveniles of the indigenous birds. In spring about a third of the adult females lay two clutches of eggs simultaneously, and while they incubate one of them, their mates are responsible for hatching and rearing the chicks of the other.

BOOK REVIEWS

Ship in the Wilderness by **Jim Snyder** and **Keith Shackleton**. Pp. 208, with 5 maps, numerous photographic plates and pen-wash sketches (in colour). J. M. Dent. 1986. £14.95.

This handsomely produced book (designed by Gaia Books Ltd), subtitled 'Voyages of the MS *Lindblad Explorer* through the last wild places on earth', contains some of the most stunningly brilliant natural history photographs that I have ever seen, and is a delight from first page to last. It is divided into four main sections, the Antarctic; the Atlantic Arctic; with the Galapagos islands, and the islands of the palaeotropics from the Philippines to Fiji, as counterpoint to the polar record, together illustrating the wild places of the earth visited each year for 15 years by this remarkable ship. The *Lindblad Explorer*, with its well-chosen crew and complement of scientists and lecturers, was the result of a vision of 'expedition cruising' formulated by Lars-Eric Lindblad. For nearly 20 years this unique adventure ship carried enthusiasts, artists and naturalists to the remotest parts of the earth, venturing further north and further south than any passenger ship before her, and visiting inaccessible landscapes with undisturbed wildlife colonies during her 1,500,000 miles of travels.

A record of this achievement, invoking history, politics (the Falklands) and personal reminiscence from the many logs kept by successive ship's naturalists has been welded into a lively, sympathetic text by Keith Shackleton, a long-time naturalist on the *Lindblad Explorer*. He also contributes many pen-and-wash sketches of coastal views and natural history subjects which are placed alongside the text in a decorative and mostly unobtrusive fashion. Text and sketch combine to give an authentic *feel* to what it must have been like to voyage across the world in this extraordinary craft. However, for me, the crowning glory of the book must remain the sustained brilliance of the colour photography. With eye and lens, Jim Snyder has composed one of the most breathtaking portfolios of natural history photographs it is possible to imagine. Additional comment on his virtuoso skill would be superfluous; buy this beautifully designed book and revel in it for yourself.

DJG

Evolution by **Raymond Hawkey**. Pp. 10, illustrated in colour. Genesis Productions. 1986. Price £9.95.

This book has five 'openings', each of which reveals an impressive 3D 'pop-up' effect. It begins with a volcano in eruption and ends with an astronaut making a 'great leap' on the surface of the moon. In between we have *Eusthenapteron* emerging onto land, dinosaurs dying, and *Australopithecus* attacking an antelope with a hand axe; as a bonus there is the skull of the 'missing link'. Additional minor effects can be achieved by pulling tabs; such things as *Homo habilis* rather wearily chipping a flint, and the sun turning into a red dwarf (though if you stop halfway the sun looks more like a gigantic electric fan, an appearance unknown to astronomy!). So far, and because of the face of a young girl on the cover (or rather, half a girl's face; the other half is the face of an ape man), the book seems designed to amuse children; but the text is quite advanced, and printed in small type. The Deputy Keeper of Public Services at the British Museum (Natural History) and three other Keepers at the Museum are credited as having assisted with the text, so it can be taken as authentic. Already it is dated: *Eusthenapteron*, the fish that is stated to be the ancestor of terrestrial vertebrates, used to be suggested for this role because it was thought to have internal nostrils; more complete and better prepared fossils have revealed that this is not the case. The extinction of the dinosaurs is attributed here to the effects of the collision of a gigantic meteorite with the earth which was alleged to have deposited the metals osmium and iridium worldwide; it is now known that these deposits are not contemporaneous. The hypothesis, popular 10 years ago, that flagellate organisms are a complex symbiosis of animal cells, algal cells, and spirochaetes, is presented as fact. All in all, this is a very mixed publication, aimed perhaps at a very mixed audience.

FHB

THE EVANIOIDEA (HYMENOPTERA, PARASITICA) OF YORKSHIRE

W. A. ELY
Clifton Park Museum, Rotherham

The insects of this superfamily are unique amongst the British Hymenoptera because the gaster (the apparent abdomen) is attached to the metasoma (the apparent thorax) on the dorsal surface, immediately behind the wings. In all other groups the gaster is sessile (sawflies) or inserted ventrally, between the coxae. There are eight British species of Evanioidea in three families and all are southern insects in Britain.

The only family so far found in Yorkshire is the Gasteruptionidae, with its single genus *Gasteruption*, which is cleptoparasitic on solitary bees. The parasite lays its egg on the egg or food store of the host and the larva hatches after two or three days. It eats the host egg and then the food store and may enter a second cell and consume the larva and food there as well (Malyshev 1964).

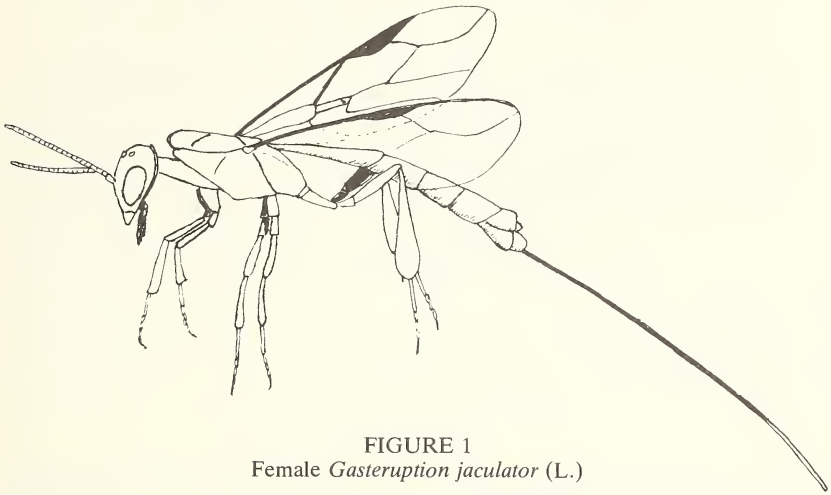


FIGURE 1
Female *Gasteruption jaculator* (L.)

The earliest recorded occurrence is an example of *Gasteruption assectator* (L.), the commonest British species, collected by W. J. Fordham at Fyling Hall, near Whitby, on 1 July 1929 (Hincks 1943). This species was later found to be mixed with the closely similar *G. minutum* (Tournier) (Crosskey 1951), so I have attempted to find Fordham's specimen in order to check it. His collection went to Liverpool but the museum there suffered from bomb damage during World War II and, although his ichneumons are present in the Merseyside County Museum, there is no *Gasteruption* with them (I. D. Wallace, *pers. comm.*). Claude Morley identified many of Fordham's ichneumons and was given several of the specimens, but there is no Yorkshire specimen with Morley's collection at Ipswich Museum (H. Mendel, *pers. comm.*) or at the British Museum (Natural History), where some of Morley's collection went. There have been no subsequent captures of *Gasteruption* from the Yorkshire coast, so this record has not been confirmed.

Although no other *Gasteruption* records from Yorkshire have been published, a specimen was observed at Askham Bog nature reserve in 1943, but was not captured (Hincks 1943, 1944). The Yorkshire Museum contains the J. H. Elliott collection of (mainly unidentified) Hymenoptera, most of which were collected around York in the 1940s and 1950s. I found three specimens of *G. jaculator* (L.) among this collection, from

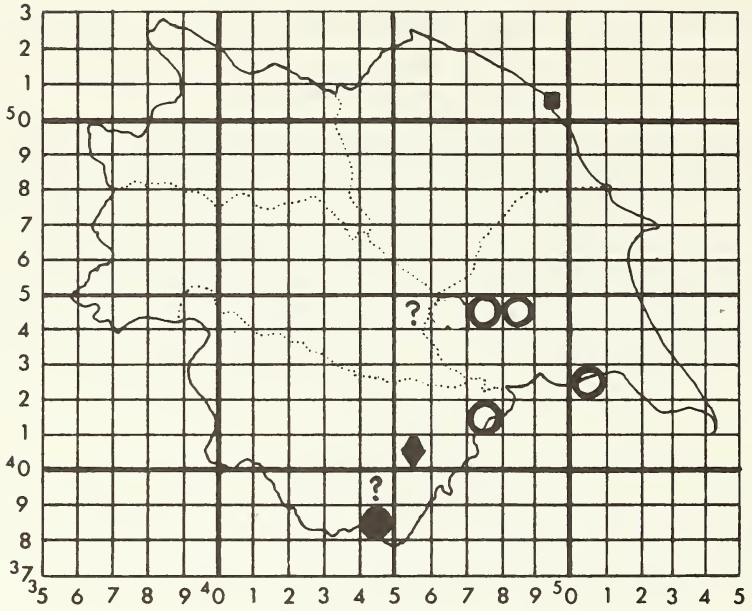


FIGURE 2
Distribution of *Gasteruption* species in Yorkshire

■ *G. assectator* (L.)
○ *G. jaculator* (L.) 1949–1951
● *G. jaculator* (L.) 1984
♦ *G. minutum* (Tournier)
? sp. indet.

Allerthorpe Common on 25 June 1950 and Shiptonthorpe on 8 July 1951, collected by Elliott, and another from Shiptonthorpe on 22 July 1951 collected by A. Smith. Mr D. H. Smith kindly allowed me to look over some specimens in his collection and there is one specimen of *jaculator* from Thorne Waste on 25 July 1949 and three collected at Hessle on 22 July 1951. Another example of this species was collected by Derek Whiteley and myself at Catcliffe Flash nature reserve on 17 July 1984, a particularly hot summer. I observed another specimen, probably *jaculator*, investigating potential host burrows near the centre of Rotherham on 26 June 1986.

While Fordham's specimen could be an example of *Gasteruption minutum*, I have taken an undoubted specimen of this insect from a Doncaster garden on 28 July 1984. It was visiting a flowerbed in company with small mining bees.

Although *Gasteruption* looks superficially like an ichneumon it can be recognized at once by its odd structure. It is a sun-loving insect and all the Yorkshire records are from late June to late July in the lowlands of central and south Yorkshire, with one from the north-east coast. I should be grateful for any odd-looking 'ichneumons' found on flower heads on hot July days.

I am grateful to Dr Ian Wallace and Mr Howard Mendel for checking their collections and to Dr Michael Fitton (British Museum (Natural History)), Mr Paul Howard (Yorkshire Museum) and Mr Don Smith for allowing me access to the collections in their care.

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FUNGUS FORAYS IN 1985

Barnsley (VC 63), 9–13 May
Sheffield (VC 63), 19–23 September

T. F. HERING

Attendance at both these forays was very satisfactory, with about 15 people using laboratory facilities, and many local friends. In the spring we had a workroom at the Northern People's College; the date chosen turned out to be too early for many of the spring fungi. The autumn meeting used a laboratory at Sheffield University, and we saw the total of agaric species recorded for Yorkshire reach 1000. This total represents some 50 years of recording, and no other county can approach it.

For the lists below I am indebted to Mr A. W. Brand, Mr A. Legg, Mr K. Payne, Mr C. Stevenson and Dr M. Storey. * = new to Yorkshire.

List of Sites

Spring	D = Deffer Wood, SE/260088
	W = Worsbrough, SE/348033
Autumn	H = Holmesfield Park, SK/315785
	C = Chatsworth Park, SK/265705
	L = Longshaw, SK/265785

Myxomycetes

Fuligo muscorum D

Ascomycetes

Geoglossum cookeanum L
Leptotrochila cerastiorum on *Cerastium* sp. L*
Peziza micropus D

Basidiomycetes

Rust and smut fungi

Melampsorella symphyti on *Symphytum* sp. W
Puccinia arenariae on *Moehringia trinervia* C
P. deschampsiae on *Deschampsia caespitosa* W

Aphyllophorales

Clavaria vermicularis L
Clavulinopsis fusiformis L
Coriolus hirsutus L
Oxyporus populinus L
Ramaria flaccida L*
Rigidoporus vitreus C

AGARICALES

Agaricus macrosporus L
Amanita crocea L
Asterophora parasitica H
Clitocybe fusipes C
C. odora C
Conocybe tenera L
Coprinus leiocephalus W, C
Eccilia sericeonitida L
Entoloma porphyrophaeum L
E. sericea L
Hygrocybe aurantiosplendens L
H. citrina L*
H. flavescens L
H. marchii L
H. metapodia C
H. nigrescens L
H. russocoriaceus L
H. strangulata L
H. subminutula L
H. subradiatus C
H. unguinosus C, L
Hygrotrama atropuncta C
Inocybe asterospora C
Leccinum carpini H
L. variicolor H
Leptonia serrulata L
Mycena amicta C
M. longiseta L
Nolanea rhombispora L*
Pholiota alnicola L
Pleurotus cornucopiae D
Pluteus cyanopus C
Russula densifolia H
Stropharia albocyanea L

FUNGI IMPERFECTI

Dilophospora sp., state of
Lidophia graminis W*

BOOK REVIEWS

John Hillaby's Yorkshire: The Moors and Dales by John Hillaby, photographs by Michael Stead. Pp. 176. Constable. 1986. £12.95.

John Hillaby reminisces about his life and rambles in various parts of Yorkshire, spicing his text with wry anecdotes and personal observations. Michael Stead's stunning photographs which actually occupy the greater part of the book illustrate industrial and natural landscapes in all moods and seasons and beautifully complement the text. Together they provide a fascinating view of selected parts of the county — Hillaby's Yorkshire, as the title indicates.

DAC

The Collins Encyclopedia of Animal Biology edited by **R. McNeill Alexander**; **The Collins Encyclopedia of Animal Ecology** edited by **P. D. Moore**; **The Collins Encyclopedia of Animal Evolution** edited by **R. J. Berry** and **A. Hallam**; **The Collins Encyclopedia of Animal Behaviour** edited by **Peter J. B. Slater**. Four volumes, each with pp. xvi + 144, many figures, plates and photographs in colour. Collins. 1986. £9.95 each.

Each of these volumes has a similar format and style and, as the publishers claim, the set provides a broad, coherent view of how the animal kingdom integrates with the rest of nature. However, each book is complete in its own right.

Individual chapters are written by acknowledged subject experts who use world-wide examples and beautiful coloured illustrations to good effect. An interesting and useful feature of all of the volumes is the use of boxed inserts to summarize specific topics such as gaseous exchange in insects or air conditioning in termite mounds.

Whilst many familiar topics such as the evolution of the modern horse from Hyracotherium or Lorenz's work on aggression are included, they are summarized and illustrated very clearly, making the books useful for reference. It is, however, refreshing to find some more unfamiliar examples; for instance, various bat species are used to illustrate feeding adaptations. These books also score in their successful tackling of

complicated topics like the role of DNA in protein synthesis or controversial ones like evolution and theology. Each book has a glossary of the technical terms used and a very good index. I would however make one or two small criticisms. Firstly, some of the artwork is a little too bright for my taste. Few I think would object to dusty old Archaeopteryx being given a splash of colour (if he really did look like that, what a twitcher's bird he would have been!), but a scarlet-breasted noctule bat is a little too much. I also find it irritating that a book edited and published in Britain should use American spellings throughout.

These however are minor points detracting little from these beautiful and useful books.

JKS

Birds of the Sheffield Area including the North-East Peak District, edited by **Jon Hornbuckle** and **David Herringshaw**. Pp. 312, with 120 line drawings and over 100 maps. Sheffield Bird Study Group and Sheffield City Libraries, Sheffield. 1985. £11.95 hardback, £8.95 paperback..

In line with the proliferation of localized reports and avifaunas which are now being produced in Yorkshire and to a lesser extent elsewhere, comes this volume, listing the status of birds within the recording area (1200 km^2) of the Sheffield Bird Study Group. A study of the area's breeding birds during the period 1975–1980 forms a major part of the work and the results are portrayed as dot maps covering the 12 tetrad squares of the area. The Group has recorded 248 species since its formation in 1972 and brief details are given for a further 12, recorded prior to that date. The passage periods of several species, notably waterfowl and waders, are presented in the form of histograms showing the monthly distribution — a method which often oversimplifies the situation.

Preliminary chapters deal with the history of the area's ornithology (8 pages) and its habitats (19 pages), visible migration (6 pages) and changes in status (6 pages). The classified list takes up 231 pages including the many line drawings which are in most cases first class, although I felt that they were too large, overshadowing instead of complementing the text.

A most useful contribution to the regional avifaunas of the British Isles and very well designed and produced. The few typographical errors are of no significance. Certainly good value for money considering the amount of work necessary for such a compilation.

JRM

Hoverflies by **Francis S. Gilbert**, with plates by **Steven J. Falk**. Naturalists' Handbook 5. Pp. 66, with 4 colour plates and 68 b/w figures. Cambridge University Press. 1986. £15 hardback, £4.50 paperback.

This is another welcome addition to the Handbook series. The rationale on the back cover explains that the publication is tailored for students and amateurs and in this respect, the many avenues presented for ecological study form the most valuable content of the book. However, the author's proficiency in the subject sometimes lays a heavy burden on the amateur. The need, for instance, to identify aphis prey would be well beyond the ability of most readers and the bibliography is daunting.

For the amateur student, it is safer to consider *Hoverflies* as whetting the appetite for deeper study and for detailed observation in the field rather than a sure means of identification. The author's comments regarding the genera *Cheilosia* and *Chrysogaster* together with the problems of teneral and abnormal specimens and a marked tendency among hoverflies to intraspecific variation reinforce the dangers of making identifications from descriptions of only some 17 per cent of the British list.

For the serious student of Syrphids, it is best to consider this handbook as a companion volume to Stubbs and Falk's *British Hoverflies* (1983) — the former supplementing the latter with a wealth of ecological data. The handbook is an excellent buy for any naturalist's library and Falk's superb plates (despite a slight loss of detail on reduction) add an extra bonus.

DHS

British Naturalists' Association Guide to Wildlife in Towns by **Ron Freethy** and **Guide to Coast and Shore** by **Brian Barnes**. Pp. 128, illustrated in colour and black and white. The Crowood Press. 1986. £7.95 each.

These two volumes are the fifth and sixth of the Association's guides. The continuance and regularity of appearance of further volumes of this interesting and informative extremely high quality well presented series is to be commended and the illustrations are excellent as is the accompanying text.

Both authors are to be complimented on their imaginative selection of subject matter and their method of presentation, which is not only informative but challenging, offering opportunities for readers to carry out investigations of their own. Each gives comprehensive coverage of the flora and fauna and in addition deals with pollution, effects of tourism, and the like.

Ron Freethy's account of the wildlife in towns must surely be an eye-opener, not only for those who spend most of their lives in urban surroundings but to the countryman as well: the possibility of badgers entering your garden or foxes raiding your dustbin fires the imagination.

Brian Barnes deals with the incredible variety of things to be found on coast and shore in a most admirable manner, achieving a pleasant balance between the various groups; for once rock pools are not presented as the only interesting habitat. With this book in hand, any stroll along the coast or shore must become far more exciting.

There is little doubt that these two books, like their predecessors, will go a long way to promoting an interest in and emphasizing the importance of natural history as a science and as a leisure activity. Don't wait until they are out of print: get your copies now.

DTR

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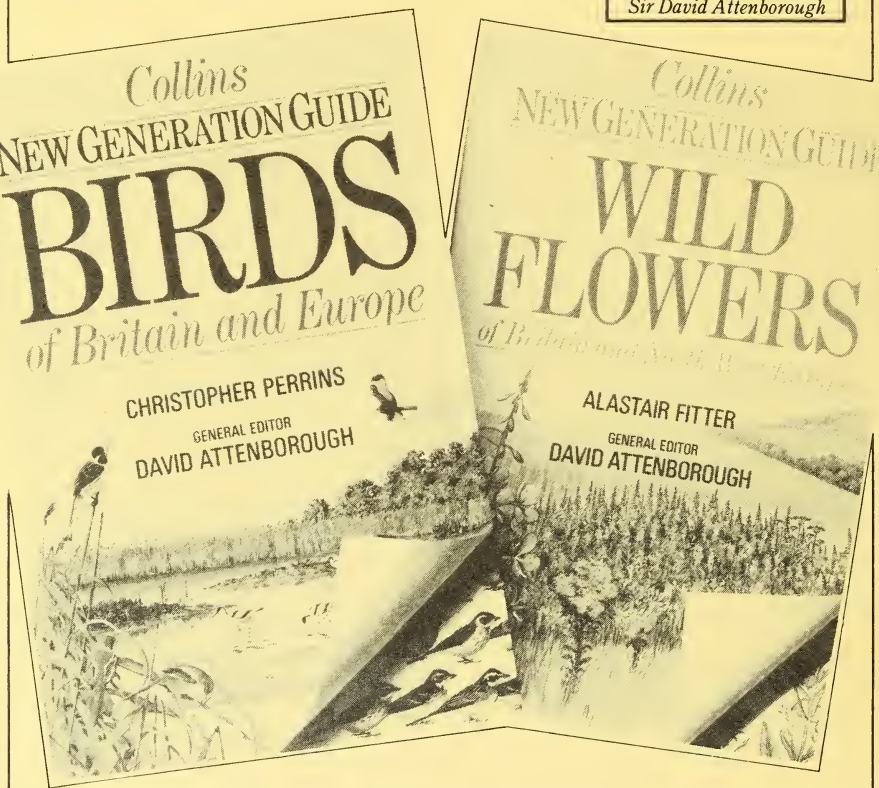

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The Naturalist

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300 Years of Yorkshire Lichenology — *M. R. D. Seaward*

Aspects of the Life History of *Unionicola ypsilophora* (Bonz, 1783) — *R. A. Baker*

Distribution and Abundance of the Starfish *Asterias rubens* L. on an Intertidal Mussel Bed in Morecambe Bay, Lancashire — *David Jones*

***Verpa conica*: a Rare Morel Found in Two New Yorkshire Vice-counties** — *A. Gramshaw, M. C. Clark and T. F. Preece*

Oribatid Mites from the Isle of Man — *Malcolm Luxton*

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

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Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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300 YEARS OF YORKSHIRE LICHENOLOGY

M. R. D. SEAWARD

Presidential Address to the Yorkshire Naturalists' Union, Masham, 6 December 1986

Introduction

Study of the Yorkshire lichen flora has been a continuing process for three centuries, during which time we have been particularly fortunate in having a succession of enthusiasts, many of whom were not only able lichenologists but were also interesting, and in some cases more than a little eccentric, personalities. Our county has also been unusually active in the formation of natural history societies, a high number of which, affiliated to the Yorkshire Naturalists' Union, continue to thrive to this day. Not surprisingly, this long period of activity has resulted in an impressive corpus of lichenological knowledge, accumulated by individuals, both amateur and professional, and societies, in the form of publications, herbarium collections and archival materials.

Progress in Yorkshire lichenology can be interpreted in terms of the cumulative number of species recorded; quantitative assessment for the first hundred years is unrealistic, but the pattern of accumulation over the past two centuries can be displayed graphically (Fig. 1): the growth curve clearly shows three periods of intensive activity (1) at the turn of the 19th century, (2) during the mid-19th century, and (3) over the past twenty-five years, which broadly coincide with national trends (Seaward 1987). Such an interpretation does not, however, truly reflect the activities of the many engaged in

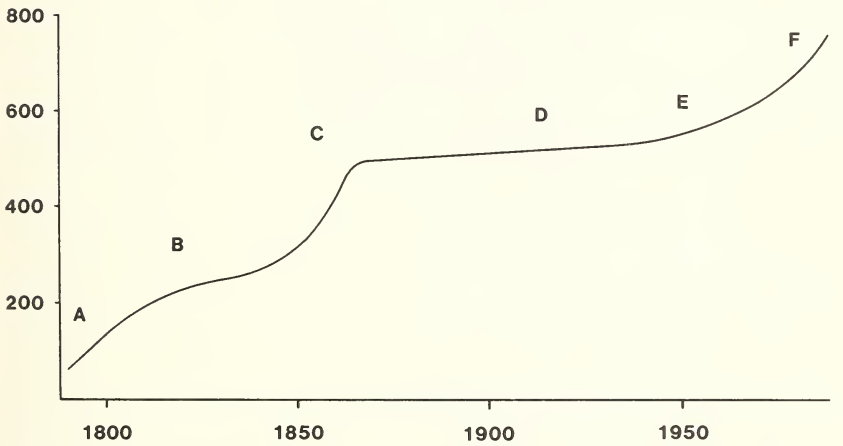


FIGURE 1

Progress in Yorkshire lichenology 1786–1986: cumulative number of species recorded; collectors for the periods indicated: A — Bolton, Brunton; B — Nowell, Bohler; C — Mudd, Dixon, Carrington; D — Lees, West, Hebden; E — Watson; F — Numerous members of the British Lichen Society.

basic field recording (for a very large county) and of those who kept lichenology alive when field guides and reference works were unavailable, when local contacts were few and far between, or when the subject fell into decline nationally. In order to appreciate more fully the development of Yorkshire lichenological knowledge, a bio-bibliographical approach has been adopted here.

Tentative Beginnings

Richard Richardson (1663–1741) of North Bierley (Fig. 2) is credited with being the first Yorkshireman to collect lichens. His main interest was in flowering plants, particularly medicinal ones of value to him as a physician. Although he published little himself, he contributed significantly to the work of other botanists. Thoresby (1715) regarded him as 'learned and ingenious' and mentions his collections of native and exotic plants. Richardson travelled extensively in search of plants and was in contact with many leading botanists of the day, including Johann Jacob Dillenius (1684–1747) who acknowledged his help in the third edition of Ray's *Synopsis* (1724), which he edited, and in his preface to *Historia muscorum* (Dillenius 1742) Richardson is referred to as '*nuper rebus humanis exemptus*'.

Yorkshire lichen records attributable to Richardson, occasionally citing the locality,

FIGURE 2
Richard Richardson FRS (1663–1741).

are scattered throughout the *Synopsis* (e.g. pp. 66, 68, 69, 71, 72, 74), *Historia muscorum* (e.g. pp. 64, 132, 142, 199), and other major British floras such as Hudson's *Flora Anglica* (see below). Richardson's botanical pursuits are said to have begun about 1687, but the first dated reference to a lichen record is 1704; his collections, now housed in the Dillenian Herbarium at Oxford University (Clokie 1964), require further investigation in terms of Yorkshire lichen material. Samuel Brewer (1670–1743), a botanical friend and neighbour of Richardson, may also have been involved in some of these collections (Seaward 1975). Further biographical details on Richardson are to be found in Nichols (1817) and Dandy (1958), and can be gleaned from some of his correspondence published in Turner (1835); two letters from the well-known Yorkshire gardener Thomas Knowlton (1691–1781) to Richardson have recently been published by Henrey (1986).

James Dickson (1738–1822) refers to Yorkshire lichens in the first three fascicles of

his *Plantarum cryptogamicarum britanniae* (1785, p. 13; 1790, p. 18; 1793, pp. 13, 14, 15); the sources of these records are unknown, one being attributed to D. Curtis, but in view of a reference made in Smith and Sowerby's *English Botany* (1807, plate no. 1778) to *Lichen candidus* (i.e. Dickson 1793, fasc. 3, p. 15) being 'first observed by Mr Dickson on rocks in Yorkshire', there is some evidence to suggest that this important lichenologist recorded from the county.

Yorkshire's most famous 18th-century botanist was James Bolton (*fl.*1750s–1799) of Halifax. Despite extensive researches (e.g. Crump & Crossland 1904, Watling & Seaward 1981), there are still major lacunae in our biographical knowledge of Bolton, and we know little of his background, including date of birth, and early life. His talent as a botanical artist and portrayer of taxonomic detail is widely recognized, but his role in Yorkshire recording is less clearly understood: there is strong reason to believe, for example, that the valuable catalogue of plants (including lichens) for the Halifax district in Watson's *History and Antiquities of the Parish of Halifax* (1775), often attributed to James Bolton, was in part due to his brother Thomas (*fl.* 1750s–1778). Nevertheless, there is little doubt that James had a hand in its compilation, particularly in respect of the fungi and lichens (Watling & Seaward 1981). Of the 83 species of lichens enumerated, 66 can be identified with certainty, the others being lost in synonymy for the most part; the list provides a rare glimpse of the luxuriance of the Yorkshire lichen flora prior to the impact of the Industrial Revolution, nearly two-thirds of the species recorded having long since disappeared due to the destruction of habitats and the rise in air pollution.

A further interesting lichen record for this period is that of *Lobaria scrobiculata* from Halifax; it is substantiated by herbarium material (Seaward 1975, figure 3) and attributed to John Lightfoot (1735–1788).

The end of the 18th century saw the publication of several major British floras, most of which contained a cryptogamic section (e.g. Hudson 1762, 1778, Withering 1796); Yorkshire lichen records, often localized, are to be encountered in these works, but most of them refer to the collections of Richardson and Bolton. The record in Hudson (1778, p. 531) of *Parmeliella plumbea*, as '*Lichen imbricatus foliolis lobatis* . . . &c', occurring '*prope* Bradford *in comitatu Eboracensi*' was an error for Bradford-on-Avon in Wiltshire that was to be perpetuated in subsequent literature for many years (e.g. Withering 1812, Seaward 1975).

Contributors to *English Botany*

The major botanical publication of this period, *English Botany* (1790–1814), illustrated by James Sowerby (1757–1822) with a text mainly prepared by James Edward Smith (1759–1828), called upon the services of a nationwide team of botanists for the collection of specimens and the provision of field notes: the illustrations, published continuously over the 24-year period, ran to 36 volumes and included *c.* 390 lichens. References to Yorkshire lichens are numerous, many being qualified by localities and the names of collectors such as William Borrer (1810, no. 2218), William Brunton (1806, no. 1549), Samuel Hailstone (1807, no. 1793), Jonathan Salt (1799, no. 593) and Robert Teesdale (1798, no. 452). From an analysis of this monumental work it is possible to gauge the involvement in Yorkshire lichenology of those living within and without the county. Of particular interest is William Borrer (1781–1862) of Henfield, Sussex (see Smail 1974, Hawksworth & Seaward 1977), one of the few British lichen taxonomists at that time, whose *Lichenographia britannica* (Turner & Borrer 1839), undertaken between 1809 and 1814 (Hawksworth & Seaward 1978), was never completed and suffered at the hands of its editor, Dawson Turner (1775–1858); Yorkshire records made by William Brunton, James Bolton, Robert Teesdale and John Harriman (see below) are included in this work.

One of the Yorkshire contributors to *English Botany* was the Rev. James Dalton (1764–1843) of Copgrove near Knaresborough, and later of Croft. His correspondence, now housed at Kew, at the British Museum (Natural History) and in the Brotherton Collection of Leeds University Library, gives us a valuable insight into botanical pursuits

at this time; after one year at his hobby he writes to James Sowerby (3/3/1802):

> I live in a very retired manner and dedicate my time to my family and *inoffensive* amusements . . . I live in a fine county but botany, as it does not often enrich its followers, is held in great contempt

and a few weeks later (13/5/1802):

> I have been truly unfortunate, having lost three children out of four. This was the manner of my undertaking the study of botany. My old amusements kept me in the house, & my heart was too heavy to bear such confinement. The great variety w[hi]ch this study presents has been of most material benefit to me: and I am now quite an *enthusiast*. Having no one to assist me, in this neighbourhood, I have been under the necessity of laying out (for me) a large sum in botanical publications. My library now contains many of the best.

Dalton obviously went to great lengths to collect material for Sowerby, for he writes (5/4/1803); 'I send you specimens of *Dicranum flexuosum* — for which I rode 34 miles yesterday'; this material was used for illustration no. 1491 in Smith and Sowerby (1805), as were several other bryophytes he collected, but his lichen collections appear as records in Turner and Dillwyn's *Botanist's Guide* (1805) and Lees' *Flora of West Yorkshire* (1888). Dalton's phanaerogamic herbarium, and some manuscript material, is in the Yorkshire Museum, York (Simms 1969), but the whereabouts of his cryptogamic herbarium, presented to that Museum in 1842, is unknown; could the latter have formed the basis, or part of, the Yorkshire Museum collection reported by Coppins and Seaward (1976) which includes material collected by Dalton and his contemporaries?

An important contributor of Yorkshire lichen records to both *English Botany* and *Botanist's Guide* was William Brunton (1775–1806) of Ripon; it is sad that so little biographical information is available on such a key figure, since his records (e.g. Lees 1888), particularly from the Studley Park area, are of major importance in evaluating Yorkshire habitats at the turn of the last century. Complementary information on the continuing richness of the lichen flora of that area up to the 1840s can be derived from an appraisal of the interesting list of herbarium material collected by William Graham McIvor (*fl.* 1840s–1876) now housed at the National Botanic Gardens, Glasnevin, Dublin (Seaward 1976). The species diversity and luxuriance of the material collected by McIvor would lead us to believe that there was a dramatic environmental deterioration sometime during the period 1850–1875, due almost certainly to air pollution, deforestation and land drainage.

Another contributor to *English Botany* was Jonathan Salt (1759–1810) of Sheffield, a close friend of its illustrator James Sowerby. Although only one lichen, *Lichen miniatus* (*Dermatocarpon miniatum*), contributed by Salt is actually illustrated (no. 593), he made notable collections from the Sheffield area in the late 18th century, which are now preserved in the Sheffield Museum (Hawksworth 1967).

The Rev. John Harriman (1760–1831) also contributed to *English Botany* at about the same time; his important collections from Teesdale included some lichens from the Yorkshire side of the river. Samuel Hailstone (1768–1851) was a solicitor in Bradford, and, as well as contributing to *English Botany*, he supplied the plant list for Whitaker's *History & Antiquities of Craven* (1805, and subsequent editions). 83 taxa are listed (a few of them questionable), many of the records being unlocalized within a relatively large area stretching from Yokenthwaite in the north to Bingley in the south, and from Slaidburn in the west to Appletreewick in the east; localized records are mainly from Malham and Bingley. Although records of at least two species are attributable to others, it would appear that Hailstone was responsible for recording the large majority of those listed (cf. Miall & Carrington 1862, Coppins & Seaward 1976).

Yorkshire records continued to be cited in British floras; the numerous editions of William Withering's *Arrangement of British Plants* (e.g. 1776, 1792, 1796, 1812) contained lichen lists with numerous entries based on Yorkshire observations made by Richard Richardson, James Edward Smith and others, but original data were lacking.

James Bohler (1797–1872), a Sheffield stocking weaver, collected medicinal plants for physicians, during the course of which he gained considerable knowledge of lichens, greatly influenced no doubt by Richard Deakin (1808/9–1873). As a result, Bohler issued 16 fascicles of *Lichenes britannici* (1835–1837) consisting of 128 specimens (or drawings by Deakin) each accompanied by a detailed text. Bohler also contributed the plant catalogue, including 34 lichen species, to Aveling's *History of Roche Abbey* (1870).

William Mudd

Yorkshire's most gifted 19th century lichenologist was undoubtedly William Mudd (1830–1879), who was employed as head gardener at Cleveland Lodge, Great Ayton. Here he came under the influence of a most remarkable schoolmaster, George Dixon (1812–1904), Superintendent of the North of England Agricultural School (later Great Ayton School), where Mudd probably assisted in practical horticultural instruction. Dixon (Fig. 3) promoted the study of natural history at this and other Quaker schools (Anon. 1891,

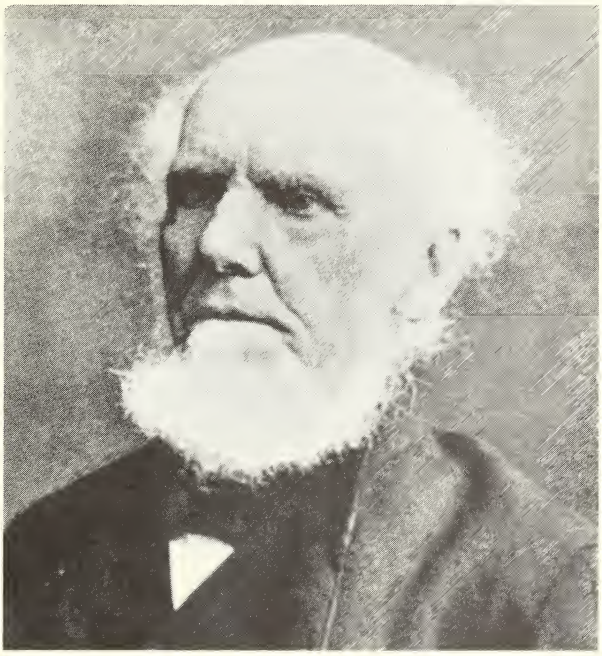
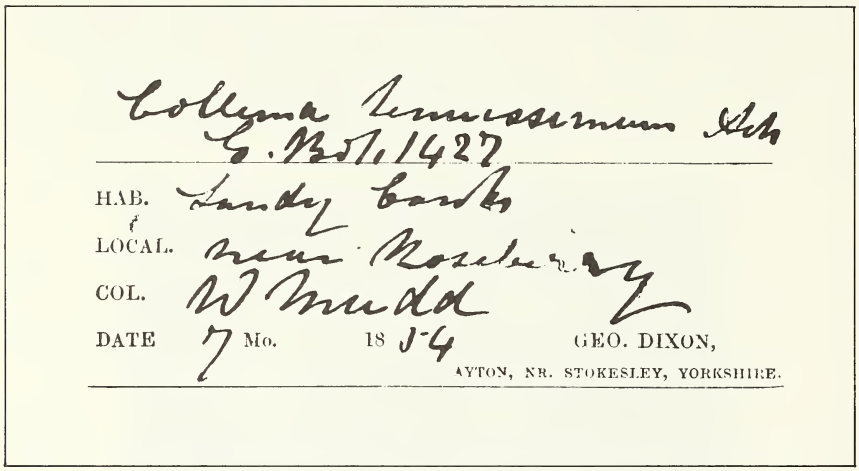


FIGURE 3
George Dixon (1812–1904).

G. A. Watson 1941), paying particular attention to the importance of botany: detailed instruction in plant taxonomy involved pupils in assembling personal pressed-plant collections of 200 to 300 specimens, each classified according to a *Handbook* prepared by Dixon (1845). The specially-prepared herbarium labels for this work were adopted by Mudd for his lichen collections (Fig. 4). Dixon also established 'The Cleveland Natural History Supply Depot' at Great Ayton, from which books and apparatus, much of it of his own invention (e.g. Dixon's Patent Plant Press), were supplied to 'working men, young students, natural history classes and home students for the successful study of botany, entomology and conchology at the least possible cost'.

Dixon was instrumental in encouraging Mudd to join a newly-formed Botanical Class in Great Ayton, and can almost certainly be credited with broadening Mudd's botanical horizons, probably instructing him in microscopy, and thereby arousing his interest in lichens. In only a very few years, Mudd had become an acknowledged expert, corresponding with many of the leading lichenologists at home and abroad; his first published paper (Mudd 1854) is an account of the remarkable lichens of the Cleveland area, which would clearly have been an inspiration for any student of lichenology. Although a few



FIGUR E 4
Example of herbarium label used by George Dixon and William Mudd.

of the localities, e.g. Oggeray Gill, cannot be identified today, it is clear that many of the lichens such as *Lobaria* and *Nephroma* have long since disappeared from the area.

After less than ten years of study, Mudd had acquired sufficient expertise in his chosen hobby to write a *Manual* (1861), the first reasonably comprehensive and practical British lichen flora, which followed the example of European lichenologists in recognizing the value of microscopic examination of spores for lichen classification and identification. He also prepared an exsiccata, *Lichenum britannicorum* (1861a), of three fascicles containing 301 specimens, to accompany his *Manual*. Much of the information used in the compilation of the *Manual* and many of the specimens contained in the exsiccata resulted from his observations and collections of Cleveland lichens. The distinctive specimen packets (e.g. Fig. 4), bearing his or Dixon's name as the collector, are to be found in herbaria all over the world; major collections of Mudd material are now housed in the British Museum (Natural History) and the Falconer Museum at Forres, Scotland.

Mudd's boundless enthusiasm for lichenology at this time is illustrated by Smith (1885) in his account of a botanical excursion to Teesdale:

> . . . all day long [Mudd] was busy chipping off fragments of lichen-covered rock, which were duly deposited in bags slung round his person; when the other gentlemen [J. G. Baker, W. Foggitt, J. Watson] retired for the night, they left Mr. Mudd still chipping and dressing his specimens, and in the morning as soon as they awoke, they heard the chip of Mr. Mudd's hammer already at work. After breakfast, they walked over Swinhope Fell and caught the morning coach at Westgate for Frosterley, which was then the terminus of the line; on arriving at the station, Mr. Mudd's bags were overhauled by one of the porters, who said Mr. Mudd would have to pay for 'excess luggage'; the party protested against

> this, and said it was impossible that the bags could be heavy, as Mr. Mudd had carried them from the High Force over Swinhope to Westgate; however, the load was placed on the scales, and it weighed over 8 stones.

It would appear that Mudd had carried this load over uneven and rugged moorland roads, with a rise and fall of approximately 1800 feet, over a distance of ten or more miles!

In 1864, Mudd's reputation was such that he was appointed as the Curator of Cambridge University Botanic Garden. Unfortunately, this did not prove an entirely happy move, and apart from issuing an exsiccata of *British Cladoniae* (1865), his lichenological activities came to an end soon after his arrival at Cambridge. According

FIGURE 5
William Mudd (1830–1879), aged about 46, then Curator of the Cambridge Botanic Garden. Detail of photograph in Walters (1981) reproduced by kind permission of Cambridge University Press.

to Walters (1981), his 'early promise seemed to come to nothing in Cambridge'. The difficulty may have been partly caused by his state of health, which had apparently been seriously affected by his overwork at microscopy of lichens before he took the Cambridge post; it seems likely, however, that he found the atmosphere of the University and his social position in town and University so alien to his experience that he could make little of it . . . The Victorian explorer Alfred Maudslay records how in 1868 he went to Cambridge to take the Natural Science Tripos, where he was coached in Botany by Mudd, 'an illiterate Scotchman [sic] who smoked very strong tobacco and smelt strongly of whisky'. Apparently Mudd thought little of Darwinism, and gave it as his opinion that 'that man Darwin will go to Hell'. According to an obituary in *The Cambridge Chronicle* (26/4/1879, p. 4), Mudd 'added to his income by instructing pupils studying for the Natural Science Tripos and the special examination in Botany, and was a great favourite of the younger members of the University'. After Mudd's time it was understood that the Curator should not do private coaching.

Mudd remains a shadowy figure: of his early life we know nothing, but according to

Johnson (1903), when about forty years of age he was 'a tall man, well-built and bony, but thin; his complexion was dark, his hair long and black' (Fig. 5). 'He was of a nervous, active temperament, with strong religious susceptibilities, and, as all such natures are, subject to melancholy and depression.' J. G. Baker (see below), Mudd's obituarist in *The Gardeners' Chronicle* (3/5/1879, pp. 558–559), wrote 'If any one will look through this [*Manual of British Lichens*], remembering that it is the production of a man who had to educate himself after reaching mature life, and who at the time that he was engaged upon it was working hard with his hands for twelve hours a-day, and keeping a wife and family upon a wage of something like 25s. a-week, he will see that the book is really a wonderful monument of energy and perseverance . . . He worked most diligently for many years when placed in circumstances where he had very few advantages, and his friends hoped for great things from him when he transferred to a more favourable position [Cambridge] — a hope that now can never be realized'. Fragmentary biographical information on Mudd can be obtained from numerous sources (e.g. Johnson 1903, Elgee 1910–1911, Hawksworth & Seaward 1977, Walters 1981); a more detailed study of his life and work is currently being compiled by this author.

Yorkshire Floras

As a result of Mudd's labours, the number of lichen species known from Yorkshire rose from about 300 in 1850 to more than 480 by 1862, the year that Miall and Carrington published their *Flora of the West Riding*. The latter work contains a lichen section compiled by Benjamin Carrington listing about 204 species, a large proportion of which are attributable to the many above-named botanists, but references are also made for the first time in connection with Yorkshire lichens to numerous other observers and collectors, such as John Gilbert Baker (1834–1920), Benjamin Carrington (1827–1893), Samuel Gibson (1789/90–1894), Louis Compton Miall (1842–1921), John Nowell (1802–1867), Richard Spruce (1817–1893), Abraham Stansfield (1802–1880), John Windsor (1787–1868), and others (I. Brown, G. Pinder, S. Slinger) for whom biographical details are lacking; most of these names recur in subsequent lichen lists and floras (e.g. Lees 1888, Watson 1946), but only a few of them are worthy of particular mention here. Lichens collected by Carrington from Yorkshire (cf. W. Watson 1941, pp. 33–34) are now housed in the Royal Botanic Garden, Edinburgh.

J. G. Baker, a highly active botanist living at Thirsk at that time (Allen 1986), was responsible for a major work on *North Yorkshire* (1863) which includes a lichen section; he also made several minor contributions to the county's lichenology, including the botany section of the *Victoria History* (1907). The lichen collection housed at the Yorkshire Museum (see above) contains material collected by Baker, and in all probability it was for a time in his possession (Coppins & Seaward 1976). A. Stansfield and J. Nowell are best known for their *Flora of Todmorden*; it contains a lichen section with south-west Yorkshire records and was published posthumously in 1911. Unfortunately, herbaria at Todmorden and Halifax, which contained lichen material collected by A. Stansfield, J. Nowell, S. Gibson and others, have been lost. Lichen records of these botanists, together with those of James Needham (1849–1913), Thomas Stansfield (*c.* 1826–1879) and Henry Thomas Soppitt (1858–1899) and several others mentioned earlier, including James Bolton, are incorporated into Crump and Crossland's *Flora of Halifax* (1904).

Richard Spruce's contribution to Yorkshire lichenology in terms of published and herbarium material is minimal. However, it is hard to imagine that this great cryptogamic botanist, who, after all, had been responsible for assembling material for lichen exsiccatae from his South American travels (Sayre 1975), was not involved in some way with Yorkshire lichenology during his later residence there (1864 to 1893).

J. Windsor, a Manchester surgeon born in Settle, treated in some detail the lichens of the Craven area, the work, *Flora Cravoniensis*, being published posthumously in 1873; his herbarium is now housed in the Manchester University Museum.

Apparently the celebrated lichenologist William Lauder Lindsay (1829–1880) paid a

visit to Yorkshire in 1859; he visited Clapham in the company of Carrington (see above). His lichen collections, including his Yorkshire material, are now at the Royal Botanic Garden, Edinburgh.

Clubs, Collections and Catalogues

William Johnson (1844–1919) of Halifax spent part of his life as a Methodist minister in Yorkshire and died in Harrogate. He published numerous papers on north of England lichens (Hawksworth & Seaward 1977), and built up extensive lichen collections, an important one of which, now housed in the Department of Plant Sciences at Leeds University, includes 69 packets from Yorkshire and 26 unlocalized gatherings from Teesdale (Seaward 1972). He also issued an important exsiccata, *The North of England Lichen-Herbarium* (1894–1918), of 13 fascicles containing in total 520 specimens, some of which were collected from Yorkshire. According to Gilbert (1980), he was drawn to the study of lichens as a result of hunting for second-hand books in Newcastle upon Tyne one Saturday evening in the mid-1870s when he picked up a copy of Lindsay's *Popular History of British Lichens* (1856). Johnson, in selecting a title which remains to this day a charming introduction to the subject, could have made no happier choice. How many other such examples of serendipity have influenced the course of lichenology?

The foremost Yorkshire botanist from the 1870s through to the early 20th century was Frederic Arnold Lees (1847–1921) of Leeds, a medical practitioner; although he wrote extensively on Yorkshire botany (Seaward 1978), only a few of his contributions include information on lichens (Hawksworth & Seaward 1977), notably his *Flora of West Yorkshire* (1888) which lists approximately 260 species. From 1873 to 1886, the Botanical Locality Record Club, spurred on by Lees' enthusiasm, accumulated records and exchanged specimens. The Club included lichens in its terms of reference; although they did not figure largely, lichen specimens in the Club's distinctive packets are occasionally to be encountered in herbaria. Lees' plant collecting was prodigious, his herbarium at Bradford Museum alone containing about 20,000 vascular and 4,000 non-vascular plants; the latter include a considerable number of Yorkshire lichens, many of them coinciding with the records published in his *Flora*.

Watson (1946) accepted Lees' determinations *en bloc*, obviously not having personally examined the lichens in the Bradford Museum herbarium; subsequent examination of the collection has shown there to be some incorrect identifications of critical material and a significant number of additions to the *Flora* (Seaward 1970). Furthermore, other material collected outside the area defined by the *Flora*, if examined, would have furnished useful data for Watson's *Lichen Flora* (1946) and *Census Catalogue* (1953): a few lichens collected (*c.* 1880) from the Rivelin Valley, Sheffield by Amos Carr (*c.* 1829–1884), a postman and shoemaker, are worthy of mention, but of particular interest are the collections made by William West (1848–1914), a pharmaceutical chemist and lecturer in botany at Bradford Technical College, who specialized in cryptogamic plants. West's lichen material is to be found in several British herbaria, particularly the Royal Botanic Garden, Edinburgh. Another botanist with an interest in crytogams was Henry Franklin Parsons (1846–1913), a medical practitioner who became Medical Officer of Health for Goole in the 1870s; he contributed to Lees' *Flora*, and his lichens are occasionally to be found in herbaria, but the lichen content (if any) of his major plant collection at Croydon has yet to be investigated.

Although Lees, West, Parsons and others in the 1870s and 1880s did not add significantly to the number of species known from Yorkshire (see Fig. 1), they considerably extended our knowledge of the ecology and distribution of lichens in the county. The next few decades were lean years for lichenology, both locally and nationally (Seaward 1987).

The lichenologist Joseph Anthony Martindale (1837–1914) is better known for his work and publications on the Westmorland lichen flora, but he also collected in north-west Yorkshire in the 1880s; his lichens are now housed in Kendal Museum.

Little is known of Abraham Shackleton (1830–1916), and his lichens, and perhaps those of his father (or other member of the family), now in the Keighley Museum, have yet to be fully investigated. However, he wrote on lichenology, including two papers in conjunction with Thomas Hebden (1849–1931), a Keighley neighbour, who came to share his interest in lichens. Hebden took early retirement from his position as director of a powerloom firm, devoting himself entirely to his hobby. He corresponded with leading British and foreign lichenologists, and was much respected by his contemporaries; his small output of published work does not reveal the true extent of his influence (Hebden 1916, 1916a, Shackleton & Hebden 1892, 1893). The results of some of his extensive lichenological activities in the Keighley area are embodied in Rotheray's *Flora of Skipton* (1900) and further local records are to be found in Seaward (1971). Hebden acted as referee for the British Museum and as Distributor for the Lichen Exchange Club of the British Isles, which functioned from 1907 to 1914; the Exchange Club reports include references to Yorkshire, and specimens, including Yorkshire material, bear a characteristic mauve impression of an oval rubber stamp on their packets (Hawksworth & Seaward 1977). Hebden accumulated an extensive library and herbarium, the contents of which are listed by Seaward (1971); the collection, now housed at Keighley Museum, awaits a more detailed investigation.

The late 19th century was an extremely active period in the history of British lichenology generally, due, in no small measure, to the dedicated work of James Morrison Crombie (1831–1906) and William Allport Leighton (1805–1889) whose published works (e.g. Crombie 1870, 1894, Leighton 1871, 1872, 1879) added very considerably to our knowledge. The second volume of Crombie's *Monograph* (1911) was completed by Annie Lorrain Smith (1854–1937), under whose name it was published; she subsequently revised both volumes (Smith 1918, 1926). All these works contain Yorkshire site details based on the work of collectors and lichenologists mentioned above, and in the case of the four *Monographs*, based entirely on herbarium material in the British Museum (Natural History).

Other notable cryptogamic botanists known to have collected lichens from Yorkshire during the first few decades of the present century were Edward Morell Holmes (1843–1930), Daniel Angell Jones (1862–1949), Henry Herbert Knight (1862–1944) and Albert Wilson (1862–1949), whose contributions were particularly valuable at a time when British lichenology was in decline (Hawksworth & Seaward 1977): they contributed papers of local interest (e.g. Jones 1925, Knight 1931, Wilson 1922, 1924) and their Yorkshire lichen material is to be found in herbaria scattered throughout the British Isles. Their efforts are recognized in terms of their contributions to Watson's *Lichen Flora* (1946) and *Census Catalogue* (1953) — see below.

During the same period, several Yorkshire botanists, such as William Holmes Burrell (1865–1945) and Christopher Arthington Cheetham (1875–1954), showed some interest in lichenology, and details of lichens observed at Yorkshire Naturalists' Union field meetings were duly reported in *The Naturalist* by William Harold Pearsall (1891–1964), Francis Arnold Mason (*c.* 1878–1936) and others. However, the major county-based contributor to Yorkshire lichenology at this time was William Edward Locking Wattam (1872–1953), a solicitor's clerk in Huddersfield. For eleven years Wattam had been a student of Thomas William Woodhead (1863–1940), a lecturer at Huddersfield Technical College and a pioneer of British ecology, who no doubt aroused his interest in lichens. Wattam's publications, mainly reports of field meetings, span 42 years. His obituarist in *The Naturalist* (1953, pp. 141–142) records his 'devotion and enthusiasm to natural history', but indicates that he was 'never primarily a taxonomist', an opinion confirmed by examination of his herbarium material, now in the Tolson Museum, Huddersfield. Although his numerous publications should be treated with some degree of caution in view of this taxonomic weakness, we are indebted to Wattam for keeping lichenology alive in Yorkshire for four decades.

One of the key figures in British lichenology over a period of more than 35 years was Walter Watson (1872–1960), a Somerset schoolmaster. His lichenology being largely

self-taught, many of his early collections of lichens were sent to Hebden for critical study. Watson published a series of notable ecological papers on the lichens and bryophytes of particular habitats, and numerous others mainly concerned with the taxonomy and distribution of lichens. He also re-examined the British collections in the Edinburgh herbarium, which contain important Yorkshire material (e.g. Watson 1939, 1942), compiled a *Lichen Flora of Yorkshire* (1946), and amassed distributional data on a vice-county basis for a *Census Catalogue of British Lichens* (1953). He was President of the Yorkshire Naturalists' Union and his address (Watson 1941) 'On Yorkshire associations, lichenological or otherwise' given at Bradford on 7 December 1940 contains material complementary to this paper.

In consequence of Watson's (1946) researches (mainly bibliographical and herbarium) on Yorkshire lichenology, the number of species recorded from the county increased to *c.* 555 (Fig. 1), about three-quarters of which, interestingly, had been recorded by William Mudd from the Cleveland area alone nearly ninety years earlier. Watson's *Census Catalogue* (1953) records *c.* 580 species from the county, when translated into modern nomenclature. Researches by the present author, particularly in respect of herbarium collections (e.g. Seaward 1976), have shown that a figure of *c.* 605 would be a reasonably accurate assessment of the state of knowledge by the 1940s.

Two other published floras, for the Scarborough and Halifax districts by Walsh and Rimington (1953) and Watling (1967) respectively, include lichen sections, but these apart, lichenology in Yorkshire stood still for a period of twenty years.

Renaissance and Recent Developments

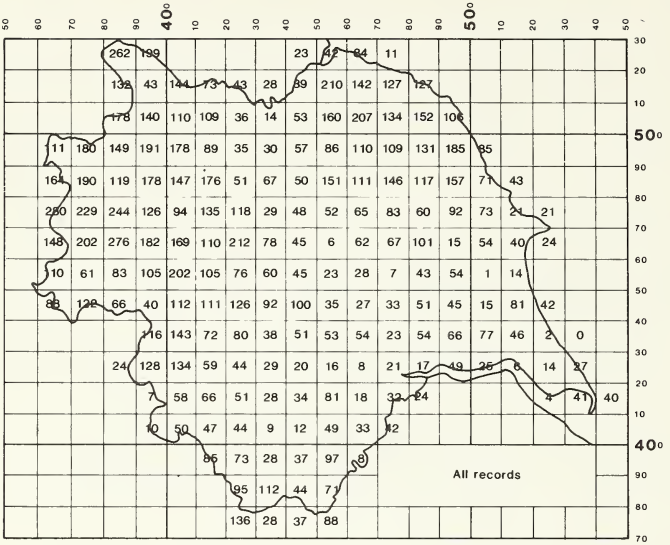
With the establishment of the British Lichen Society in 1958, there has been an increase in interest in the subject unequalled since the last quarter of the 19th century. The availability of aids to lichen identification and the provision of field courses since 1958 have also been instrumental in encouraging this revival. The advancement of lichenological knowledge for Yorkshire has mirrored that at national level: for nearly thirty years county-based and visiting lichenologists have been responsible not only for increasing the tally of species known to occur in the county (Fig. 1) but also for considerably extending our knowledge of lichen ecology and geography, and thereby our understanding of Yorkshire habitats, since these plants are valuable monitors of environmental stability and change.

For the past three decades Malham Tarn Field Centre has provided a focus for lichenological activities in the county: lichen courses run by A. E. Wade, P. W. James, O. L. Gilbert and M. R. D. Seaward have stimulated local interest and recording, and the Centre has proved an excellent base from which to research lichens (e.g. Sinker 1960, Raistrick & Gilbert 1963, Jaggard *et al.* 1974).

Several British Lichen Society field meetings have been partially or wholly based in Yorkshire, although the findings of only two of them, those held in the Richmond and Hebden Valley areas, have been published in detail (Coppins 1972, Earland-Bennett & Seaward 1974). In addition, the reporting of lichens recorded during Yorkshire Naturalists' Union excursions has been revived, and since 1971 information has appeared fairly regularly in *The Naturalist*.

Since its creation in 1963, the national mapping programme of the British Lichen Society has also provided a stimulus for Yorkshire lichenology. County records on a 10 km x 10 km grid basis are stored within the national database housed in the University of Bradford Computer Centre: the present extent of Yorkshire distributional data, as determined by past and recent records currently held in the computer, is given in Figures 6a and 6b. Contributors to this mapping scheme are far too numerous to mention them all individually; however, the following recorders have been particularly active: B. J. Coppins, P. M. Earland-Bennett, B. W. Fox, A. Fryday, O. L. Gilbert, G. G. Graham, A. Henderson, C. J. B. Hitch, P. W. James, F. Rose, M. R. D. Seaward, D. H. Smith, P. R. Stewart, T. D. V. Swinscow and A. E. Wade. Their field data have been used for site analyses, air pollution monitoring studies, distribution maps published

(a)



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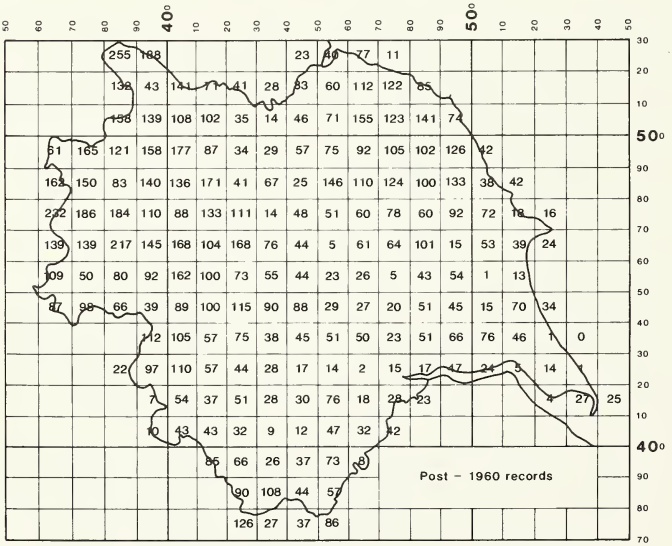

FIGURE 6
Number of lichen taxa recorded from each Yorkshire 10 km x 10 km grid square: a — all records; b — post-1960 records only. (NB. Border squares may contain records pertaining to the neighbouring county.)

periodically in *The Lichenologist*, *Atlases* (Seaward & Hitch 1982, Seaward 1985) and other publications, particularly taxonomic studies (e.g. Earland-Bennett 1975, Gilbert *et al.* 1981).

With the exception of air pollution and urban studies, recent ecological investigations on Yorkshire lichens, other than a single paper by Gilbert (1984) and those concerned with the Malham area (see above), have rarely appeared in print. However, since 1967 a large corpus of information on the ecology and performance of lichens in urban areas has been derived from studies centred upon the West Yorkshire conurbation; major aspects of this work appeared in the first instance in the form of a flora (Seaward 1975) and an autecological study of *Lecanora muralis* (Seaward 1976a). A considerable number of papers relating to air pollution monitoring by means of lichens has resulted from these studies; in addition, regularly published supplements to the flora (Seaward 1978a, 1981, Seaward & Henderson 1984), makes this conurbation one of the most intensively studied of all urban areas from a lichenological point of view.

By 1986, the Yorkshire lichen flora could be summarized as follows: 755 taxa (733 species, 7 subspecies, 11 varieties and 4 forms) have been recorded from the county over the past 300 years (Fig. 1), of which 223 are based on old records, the great majority presumed extinct since they have not been seen for a century or more; of the 532 extant taxa, approximately 150 have been discovered during the past thirty years. Notable extinctions include the genera *Nephroma*, *Parmeliella*, *Sticta* and *Teloschistes* and several species of each of the genera *Collema*, *Lecanactis*, *Leptogium*, *Lobaria*, *Rinodina* and *Usnea*.

Although numerous other lichens remain to be discovered in Yorkshire, particularly the more inconspicuous taxa, and many areas require further study (cf. Fig. 6b) before a clearer picture of the distribution and ecology of certain lichens emerges, nevertheless we will soon have sufficient data on which to base a new Yorkshire lichen flora. Research and publications resulting in detailed lists, floras, time-space analyses and other critical appraisals of changes in status of lichens are to be encouraged since these remarkably sensitive plants can be used to reveal even minor environmental disturbances including those which are so often brought about by man's activities.

Lichens still exert as strong a fascination on those who study them today as they did over a century and a half ago for the nature poet John Clare:

> But he the man of science and of taste
> Sees wealth far richer in the worthless waste
> Where bits of lichen and a sprig of moss
> Will all the raptures of his mind engross.

Acknowledgements

Space does not permit me to mention the many friends and colleagues who have helped and encouraged me in the pursuance of twenty-five years of lichenizing: to those whose company I have shared in field and laboratory, to those who have given or loaned lichen material and publications, and to those who have shown me so many favours, I extend my warmest thanks. I also take this opportunity of thanking the Yorkshire Naturalists' Union for honouring me with their Presidency, the Brotherton Library of the University of Leeds for access to valuable archival material and books, and Cambridge University Press for permission to reproduce Figure 5 and Mr S. Davidson for his help in the preparation of Figures 1 and 6.

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ASPECTS OF THE LIFE HISTORY OF *UNIONICOLA YPSILOPHORA* (Bonz 1783), A FRESHWATER MITE LIVING IN THE SWAN MUSSEL, *ANODONTA CYGNEA (L.)*

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Introduction

Unionicola ypsilophora (Bonz 1783) is one of two common resident species of Unionicolid mite found in mussels in Europe. As far as it is known it has only recently been recorded in Yorkshire (Baker 1987) but Mitchell and Pitchford (1953) give several localities where it occurs in the North of England along with *U. intermedia* (Koenike 1882), the other resident species reported in Yorkshire (Baker 1976). This family of freshwater mites is unique in being found in both molluscs and sponges. There are both resident and transient species. Resident species are defined as those in which the nymphal and adult stages are found in their hosts whereas transient species spend only their resting stages in the host. Resting stages occur between the larval stage and nymph and between nymph and adult, described variously as the nymphochrysalis or post-larval resting stage I and the teleiochrysalis or postlarval resting stage II. The larval stage of Unionicolids has been recorded from midges.

The life cycles of several species have been studied. Mitchell (1965) worked on *U. fossulata* (Koenike 1895), Crowell and Davids (1979) on the sponge inhabiting mites *U. crassipes* (Müller 1776) and *U. minor* (Soar 1900), and Gordon *et al.* (1979) on *U. formosa* (Dana and Whelpley 1830), a species believed to be very closely related to *U. ypsilophora*. The most thorough account to date deals with the same species in North America (Dimock 1985).

Previous studies have largely ignored nymphs. Baker (1987) has, however, recently reported large numbers of nymphs in *Anodonta cygnea* (L.) Little information is available on seasonality in European adult forms apart from the work of Hevers (1980) in the species occurring in Germany.

The present paper describes the results obtained from monthly samples of *A. cygnea* collected throughout the year. It discusses the seasonal dynamics of *U. ypsilophora*, records observations of the fecundity, age and the numbers and incidence of the active stages of this species in its molluscan host.

Materials and Methods

Monthly samples of *Anodonta* were collected from May 1985 to May 1986, using a hand grab, from the upper lake at Roundhay Park in Leeds. The lake is approximately two acres in area, four feet in depth at its deepest point and constructed of quarried stone. The molluscs were opened on return to the laboratory by cutting through the adductor muscles and examined under a binocular microscope. All the active nymphs and adults were removed and preserved in Koenike's fluid for subsequent examination. The presence or absence of eggs from both gill and mantle tissue was recorded. Temporary preparations were made of the active stages using lactic acid and Faures medium was used for permanent mounts. Samples of nymphs from different mussels in each monthly collection were mounted to check their identification using the key of Hevers (1979). Every adult mite was examined in order to identify (Hevers 1978) sex and to determine the approximate age of the females. Due to the lake freezing no sample was obtained in February. Two samples were therefore taken in both early and late March.

Observations

A total of nearly 2,000 active stages of *U. ypsilophora* have been collected and examined from 152 mussels, made up of 698 adults and 1,273 nymphs.

The eggs of *U. ypsilophora* are laid in the outer lamellae of the gills of *A. cygnea*. Eggs were also occasionally observed in the mantle but were found to belong to a transient species, *U. aculeata* (Koenike 1890). Verification of this was obtained by maintaining eggs under laboratory conditions until they hatched and identifying the larval stage. Several workers have recorded larvae attached to midges but free swimming larvae are rarely found in mussel hosts under natural conditions. It is widely accepted that larvae on hatching leave the mussel and seek out midge pupae to which they attach. Larvae thus act as the distributive stage in the life cycle.

Nymphs of *U. ypsilophora* vary considerably in size, and probably represent young unfed and older engorged nymphs. A significant number of larger nymphs were green in colour, indicating the likelihood of an algal diet. Nymphal mites were found between the gill lamellae. The mean number per host was 8.38 (± 0.71). Monthly collections indicate very few nymphs in the summer months with a nymphal peak in the winter (Fig. 1). In the spring, the numbers roughly equal the number of adults found; from

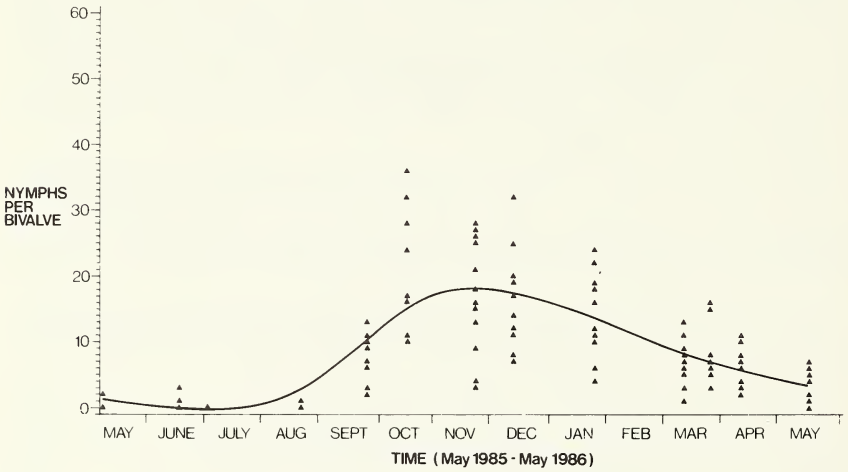

FIGURE 1
Seasonal variation in the number of nymphs of *U. ypsilophora* in each *A. cygnea*.

June to August only 10 nymphs were collected from 35 mussels but during the months October to January their numbers far exceed the numbers of adults. Nymphal mites were found in all mussels collected during eight months of the year (September 1985 to April 1986). Table 1 shows the percentage incidence of infection. No nymphs were found in any of the mussels collected in July and there was only a 27 per cent incidence in August.

Males and ovigerous females, 94 per cent of all females recovered, are found throughout the year. It is possible to age females by their size, colour and the presence or absence of eggs. Pigmentation increases with age, the oldest females being black. Three main types have been recognized but some females are difficult to categorize, appearing to be intermediate stages. Small transparaent females (see Table 2 for measurements) without eggs and lacking pigment appear in the population in spring, reaching a peak in August (28 per cent). These are young females in which the ovaries

TABLE 1
Summarized seasonal record of infection of nymphs and adults of *U. ypsilophora* in *A. cygnea*

		May 1985	June	July	Aug	Sept	Oct	Nov	Dec	Jan 1986	Mar	Mar	April	May
NYMPHS	No of mussels	3	12	12	11	13	10	14	13	12	14	14	12	12
	No infected	2	5	0	3	13	10	14	13	12	14	14	12	11
	% of incidence	66.7	41.7	0	27.3	100	100	100	100	100	100	100	100	9.7
	Mean no nymphs per mussel	1.3	0.6	0	0.3	7.7	19.6	19.5	15.7	14.3	6.9	7.4	5.9	3.7
MALES	No of mussels	3	12	12	11	13	10	14	13	12	14	14	12	12
	No infected	1	7	9	11	10	7	10	11	10	11	12	9	8
	% of incidence	33.3	58.3	75	100	76.9	70	71.4	84.6	83.3	78.6	85.7	75	66.6
	Mean no males per mussel	0.3	0.6	0.8	1.0	0.8	0.9	0.7	0.9	0.8	0.8	0.9	0.8	0.7
FEMALES	No of mussels	3	12	12	11	13	10	14	13	12	14	14	12	12
	No infected	3	11	11	11	13	9	13	13	10	12	14	12	12
	% of incidence	100	91.7	91.7	100	100	90	92.9	100	83.3	85.7	100	100	100
	Mean no females per mussel	2.3	2.2	2.0	4.6	3.0	4.2	4.0	3.5	3.5	4.9	5.1	3.5	5.4

have not ripened. Peak numbers of large black females are found in the spring, forming 50 per cent of the adult females in April. These are the oldest females. Medium sized brown ovigerous females are the most commonly found and their period of maximum abundance occurs from September to January.

Statistical analysis of the monthly collections demonstrates a highly significant month to month variation in both the average number of nymphs (0.01 per cent) and females (1 per cent) per bivalve, but not in males. 74 per cent of the mussels were infected with male and 95 per cent with female *U. ypsilophora.* Incidence of infection between May

TABLE 2

Measurements of the idiosoma of nymphs and females of *U. ypsilophora*

		Length (μm)	Breadth (μm)
Nymphs	Average (n=6) large	804	449
	Average (n=6) small	537	238
	Minimum	442	195
	Maximum	845	520
Adults	Average (n=7) small, unripe	1281	674
	Minimum	1150	552
	Maximum	1427	805
	Average (n=9) medium, ovigerous	1602	992
	Minimum	1449	805
	Maximum	1725	1150
	Average (n=9) large, black	1781	1109
	Minimum	1610	1035
	Maximum	1840	1219

1985 and May 1986 for males and females is shown in Table 1. The percentage incidence is fairly constant for females and more variable for males. The mean number of female mites per host was 3.82 (± 0.20) out of a total of 580 females examined. Few hosts had more than seven females, but in one mussel fourteen females were found. 115 mussels contained a single male, 36 had no male and only one mussel had more than one male. The mean number of males per host was 0.78 (± 0.04).

Discussion

It is now widely recognized that the sex ratios of Unionicolid mites are highly skewed. Males are underdispersed and normally a single male is found per host (Mitchell 1965, Davids 1973, Gordon *et al.* 1979, Dimock 1985).

Previous authors have recorded large differences in the abundance of adult Unionicolids per host. Local factors such as the physical and chemical nature of the body of water may be important in determining these differences. Geographical location, host size and population are cited by Dimock (1985) as factors which might affect the density of *U. formosa* in its host. Dimock records as many as 78 female:one male in *A. imbecillis* and 52:1 in *A. cataracta* in North Carolina, U.S.A., figures far higher than those observed for *U. ypsilophora* in the present study. Unlike females, the male mites were uniformly distributed with a mean density of 0.78 ± 0.04 SE, a figure which relates closely to the findings of Dimock (0.99 ± 0.01 SE).

Seasonal variations in the number of *U. ypsilophora* adults per mussel and recruitment into the population provide results which largely confirm the findings of Dimock (1985). Significant seasonal differences have been demonstrated in female numbers per host but not in males of *U. ypsilophora.* Gordon *et al.* (1979) detected no such seasonal differences in *U. formosa.*

The current work shows that the largest numbers of black females occur in spring, especially in April. These form the old generation which dies off in late spring and early summer. By August–September an average of only 9.2 per cent black females was found compared to 50 per cent of the female population in April. Young adults without eggs begin to appear in the population in April, reach a peak (28 per cent of the female population) in August, dropping to 3 per cent in September. It appears that a switch from the old to the new generation starts in the spring: old females die and the new generation is established in the warmest months of the year. The adults mature quickly to form brown ovigerous females which overwinter. The large black females, believed to be the oldest, have probably survived through two winters.

The data obtained for nymphs shows significant seasonal variations in host loadings with a winter peak and very few nymphs in the summer months. Their numbers are such that they form the dominant stage in the life cycle for eight months of the year, overwinter chiefly in the form of nymphs and for much of this time far outweigh the number of adults in the population. Assuming nymphs remain in their host, there is a significant loss between the nymph and adult stage. However, the currently available data on Unionicolid nymphs is contradictory and further work is needed. Gordon *et al.* (1979) noted small numbers throughout their study, always substantially smaller numbers than the adults, with the absence of nymphs from two samples in July. Mitchell (1965) by contrast described a nymphal peak in July, a month when in the present study no nymphs were found. Crowell and Davids (1979) recorded no nymphs in late November and December whereas nymphs were predominant in the present study from October to January. Finally, Dimock (1985) found nymphs throughout the year with both summer and winter maxima and far fewer nymphs per host when compared with the present study.

Although post-larval resting stages were not observed in *A. cygnea*, it is generally believed that these occur within mussels in resident species and that nymphs once hatched remain in the host. Hevers (1980), working on *U. ypsilophora* and *U. intermedia*, states that resident species remain inside the mussel after hatching and in the case of *U. ypsilophora*, post-larval resting stages are found in the mantle of the host. According to Gordon *et al.* (1979), the situation is different in *U. formosa*, since these authors state that the nymphochrysalis (post-larval resting stage I) occurs outside the host and nymphs then re-invade. The evidence for this is based partly on the relatively small numbers of nymphs found. The large numbers of nymphs found in the present study suggest evidence in favour of nymphs remaining in the host, at least in the colder months, but the fact that post-larval resting stages I and II were not found in the mantle, as Hevers (1980) records occurs in *U. ypsilophora*, is puzzling. Preliminary evidence reported elsewhere (Baker 1987) does indicate that female *U. ypsilophora* can recolonize mussels if artificially removed.

As was pointed out by Jones and Baker (1984), single mussels may contain more than one species of Unionicolid. Even if only one adult species is recorded, the eggs and resting stages of more than one species are commonly found. Hatching of eggs in the laboratory is essential in order to determine which and how many species are found if valid conclusions are to be drawn. Gordon *et al.* (1979) recorded eggs in the mantle of *A. cataracta* and assigned them to *U. formosa*. Eggs found in the mantle of *A. cygnea* have been shown to belong to the transient species *U. aculeata*, the resident species *U. ypsilophora* laying eggs in the gill tissue.

Summary

Eggs of *U. ypsilophora* are laid in the gills of *A. cygnea*. Eggs of a transient species, *U. aculeata* are found in the mantle. Post-larval resting stages I and II of *U. ypsilophora* were not observed in the mantle. Nymphs collected throughout the year from *A. cygnea* showed very small numbers in June, July and August but large numbers in the winter months, with a peak in October–November. Significant seasonal variations in the average of females and nymphs per host were recorded. Males and ovigerous females, aged

according to pigmentation and size, occurred throughout the year and 94 per cent of females carried eggs. Immature females were most commonly found in August, the oldest females from March to April. The loss of the old female generations is followed by the development of a new generation, the overlap occurring in the late spring and summer months.

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BOOK REVIEW

Pocket Guide to the Birds of Ireland by **Gordon D'Arcy**. Pp. 75, with full-colour illustrations. Appletree Press, Belfast. 1986. £3.50, plastic covers.

A quick flick through the pages will enable identification of over 120 birds from sea, estuaries, fields and gardens. Each coloured illustration is accompanied by a concise description of the bird's characteristics and call, though no indication is given of the distribution of the different species. This small, conveniently-shaped pocket-book is ideal for any visitor to Ireland, and in addition would be most useful for those starting to birdwatch anywhere in the British Isles.

DHSR

DISTRIBUTION AND ABUNDANCE OF THE STARFISH *ASTERIAS RUBENS* L. ON AN INTERTIDAL MUSSEL BED IN MORECAMBE BAY, LANCASHIRE, 1954–85, WITH OBSERVATIONS ON BIRD PREDATION

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Introduction

Asterias rubens L. has been reported as aggregating seasonally, but irregularly, on beds of mussels, *Mytilus edulis* L. (Sloan & Aldridge 1981, Dare 1982). This paper describes the distribution and abundance of two size groups of *A. rubens* on an intertidal mussel bed and incidence of bird predation, in 26 years between 1954 and 1985.

Study Area and Methods

The study area and methods employed have been fully described elsewhere (Jones & Clare 1977). The mussel bed covers part of an otherwise sandy shore between Morecambe and Heysham in the SE of Morecambe Bay (Grid Ref. SD 4163). The substrate consists of small stones with scattered larger stones and boulders. The study area is of particular interest since it lies only 3 km from two nuclear power stations, Heysham A and Heysham B, which when fully operational will discharge large quantities of heated sea water. The data reported here were obtained before any large discharge had occurred. It is hoped that observations will continue well into the discharge period.

Initially the whole of the mussel bed down to LWS was examined, and subsequently 5 selected search paths were walked for approximately 2 hours each, the same stones, boulders and pools being examined each month. If conditions proved unfavourable due to mussel spat-settlement or movement of mussels or sand banks the nearest accessible area was examined. Search paths 1 and 2 were both recorded as the high area, search path 3 as the middle area, search path 4 as the low area, and search path 5 as LWS. The tidal levels and vertical ranges of these areas are shown in Fig. 1.

Six arbitrary abundance categories were distinguished. For the large starfish (4 cm or more from arm tip to centre of body): absent, rare (1–3 individuals recorded), frequent (>3 individuals, scattered), common (small conspicuous groups), abundant (groups covering large areas involving hundreds of starfish), and superabundant (invasions, with extensive areas of substrate covered by thousands of starfish). These categories were scored 0–5 respectively. The small starfish (<4 cm from arm tip to body centre) unless abundant were found only beneath small stones and shells; for these, frequent denoted >3 individuals, and common, using most available stones and shells.

The efficiency with which the LWS area could be searched was influenced by onshore winds and, in winter months, many searches being made at night using a torch. However, partial examination did not appear to affect the abundance of starfish recorded significantly.

Results

Small specimens of *A. rubens* were generally found under stones and shells. However, during years when they were abundant they were also found exposed upon the shore. They were found on all areas: of the total number of occasions on which small individuals were observed, 37 per cent were at LWS, 33 per cent at the low area, 17 per cent at the middle area and 13 per cent at the high area. In contrast large specimens did not seek shelter and were very mobile. 76 per cent of all observations occurred at LWS, and 24 per cent at the low area.

Small specimens were generally most abundant from August to October (Fig. 2A) although the only invasion of small starfish occurred during March and April. The total

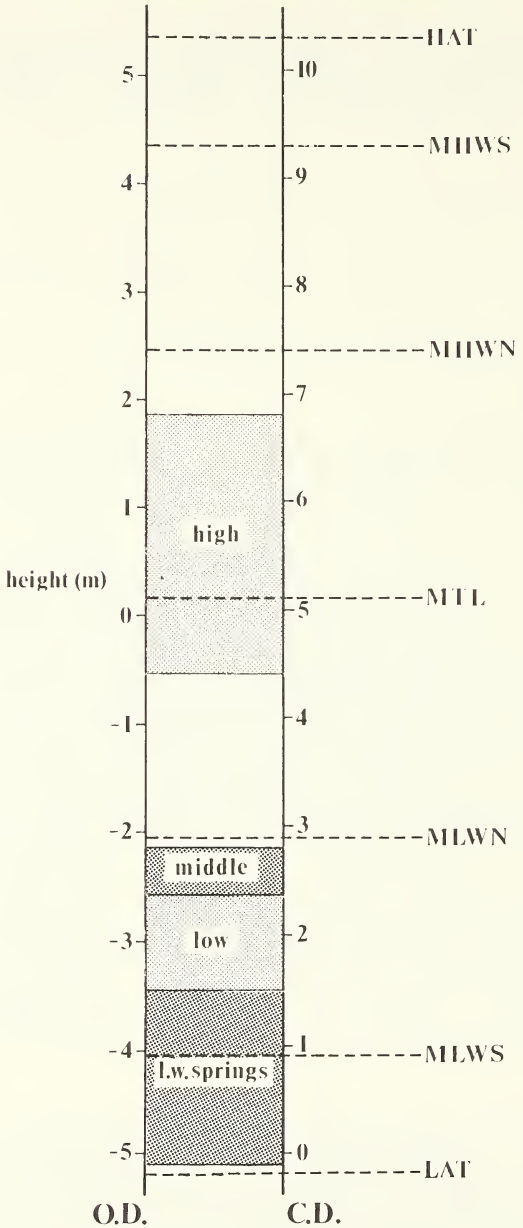

FIGURE 1
Vertical ranges of search paths relative to ordnance datum (OD), chart datum (CD) and mean tidal height based on the Admiralty data for Heysham.

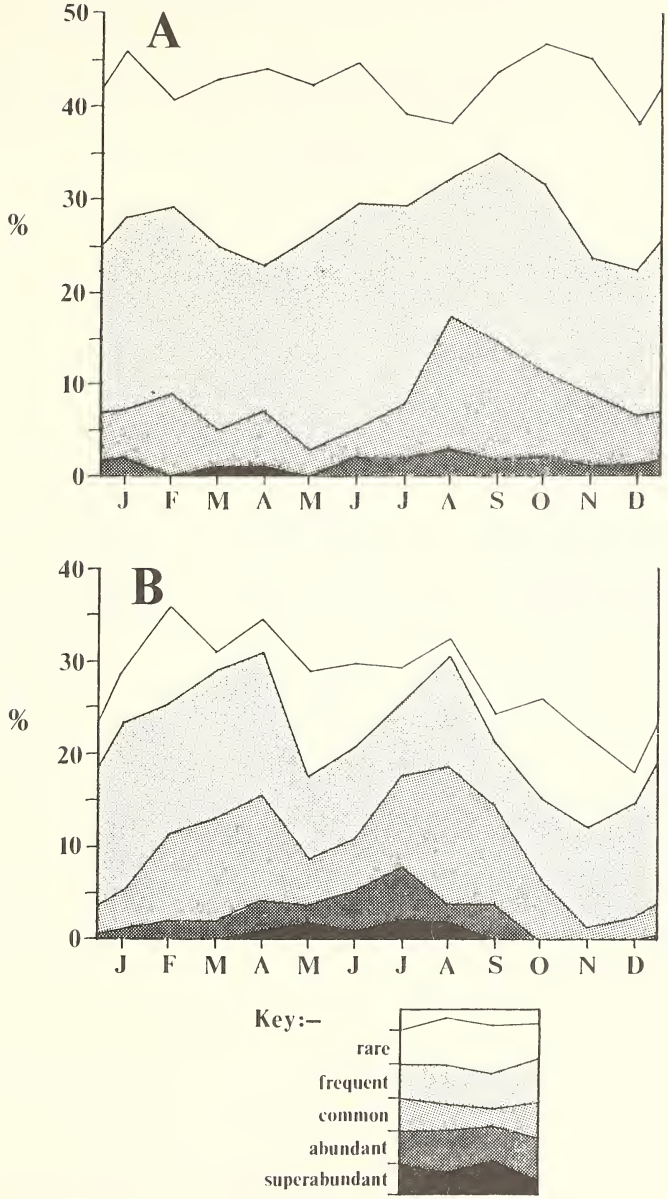

FIGURE 2
Seasonal variations in abundance of *Asterias rubens*. Cumulative percentage distribution based on data obtained at all shore levels over 26 years. A — starfish <4 cm radius, B — starfish >4 cm radius.

abundance of small specimens of *A. rubens* was much reduced after the cold winter of 1962–63 (Fig. 3A).

Peaks of abundance of large specimens usually occurred in spring and late summer (Fig. 2B). They were least abundant during October, November, and December. Invasions of large *A. rubens* were observed from May–August 1954, July–August 1957, and April–June 1984 (Fig. 2B). The total abundance of large specimens was also much reduced after the cold winter of 1962–63 (Fig. 3B).

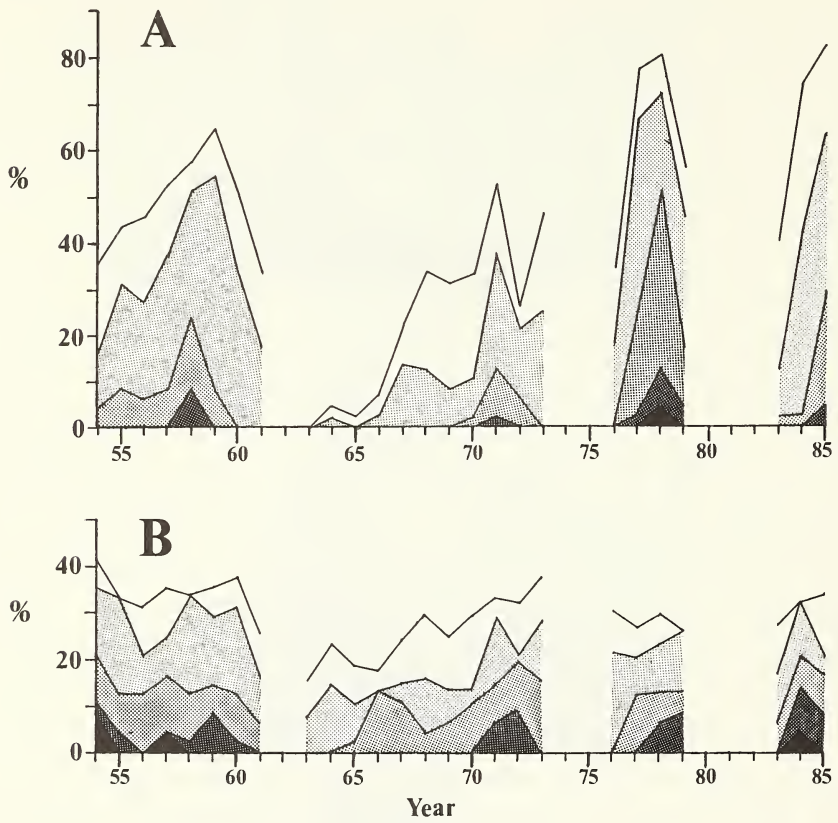

FIGURE 3
Long-term fluctuations in abundance of *Asterias rubens*. A — starfish <4 cm radius, B — starfish >4 cm radius.
For key to abundance categories see Fig. 2.

In 16 of the 26 study years, recently settled small juveniles (<3 mm from disc centre to arm tip) were recorded as rare or frequent at the low area and LWS in July, August and September.

Most *A. rubens* attacked by birds were adults. The birds pecked open, or completely removed, the arms of large *A. rubens* and occasionally took small starfish whole, from evidence of regurgitation. Attacks were most frequent between February and April (Fig. 4) corresponding to the period when gonads were well developed. No bird damage was

observed between June and November 1956 to 1961 even during invasions; however, after the cold winter of 1962–63, attacks were recorded in all months of the year.

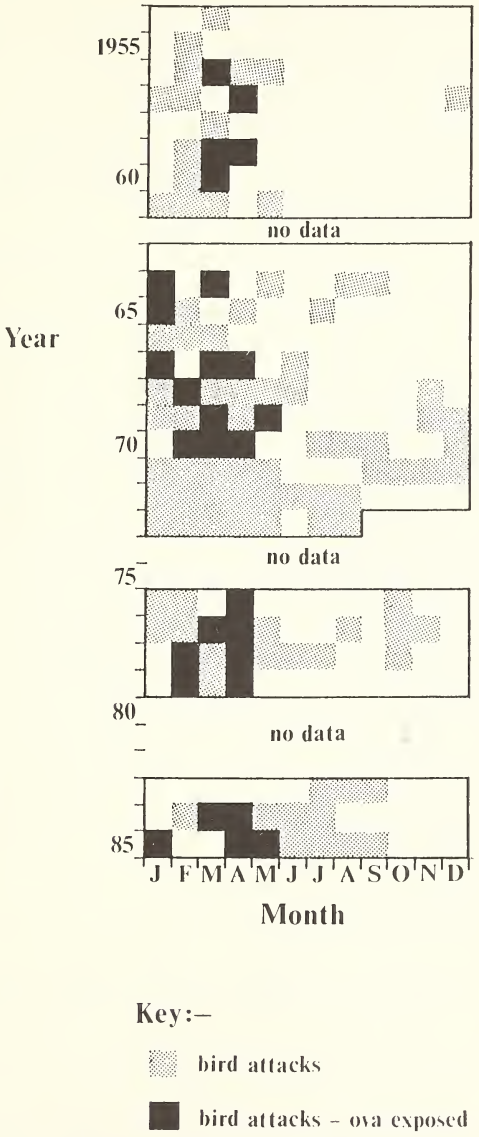

FIGURE 4
Months when *Asterias rubens* were attacked by birds.

Discussion

It is tempting to attribute the reduction in abundance of both small and large *A. rubens* after the cold winter of 1962–63 to the exceptional coldness of that winter. However, caution is necessary since Crisp (1964) found that numbers of *A. rubens* did not decline at North Wales sites after 1962, and in the present study numbers were already low in 1961. Furthermore, the unusually cold winter of 1978–79 was accompanied by only a relatively small decline in numbers of small and large specimens.

The timing of gonad development and recruitment of juveniles on the mussel bed is similar to that reported at other sites in Britain, Vevers (1949) finding ripe eggs from February to the beginning of June, and Chadwick (1923) reporting that spawning in the vicinity of Port Erin begins in about the middle of February. Recruitment to an intertidal population of *A. rubens* at Hollicombe Reef (S.W. England) occurred in July 1980 and September 1981 (Barker & Nichols 1983).

Sibly and McCleery (1983), investigating *A. rubens* predation by herring gulls (*Larus argentatus* Pontopp) on a mussel bed in the north of Morecambe Bay, suggested that gulls sometimes eat only the gonads of the starfish. However, in the present study attacks were recorded all the year round after the cold winter of 1962–63 (Fig. 4). It appears probable that severe food shortages in and immediately after this exceptionally hard winter, when numbers of many littoral invertebrates were reduced (Crisp 1964), induced a change in feeding behaviour. Bird attacks appear to have little impact on starfish numbers (Dare, pers. comm.).

Between 1968 and 1976 Dare (1982) recorded 5 invasions within the littoral zone on a mussel bed situated on the northern side of the 16 km wide entrance to Morecambe Bay. No invasions were recorded on the Heysham mussel bed during this period. On both mussel beds invasions were confined to the March–August period (Figs. 2A,B). The reason for the offshore movement of large *A. rubens* is unknown. Mussels of all sizes are available on the Heysham mussel bed all the year round, and the onset of rough weather did not apparently affect the starfish that remained on the shore. Also, numbers of the small size group of *A. rubens* were only slightly reduced (Fig. 2A).

Sloan and Aldridge (1981) concluded from the unimodal size distribution of *A. rubens* aggregations in Morecambe Bay that specimens had originated from a single settlement of larvae. The observation in the present study of one invasion of small size group *A. rubens* supports this finding.

During the 1984 invasion local fishermen gathered approximately 100,000 13–20 cm diameter *A. rubens* (J. Foster, pers. comm.). While numbers of large *A. rubens* were lower in 1985 than in 1984 (Fig. 3B), they were as great as those in most years prior to 1984, so that this intensive collecting appears to have had little, if any, effect on abundance. The only other echinoderm observed on the Heysham mussel bed was *Ophiothrix fragilis* (Abildgaard). It was found every year from 1954 to 1961 but was not seen again until 1969, and subsequently was recorded in 9 years. It was often found on the sponge *Halichondria panicea* (Pallas) but also occurred beneath stones and shells, and occasionally exposed on the shore.

Acknowledgements

I thank Drs T. G. Piearce, S. Warrington and P. J. Dare for commenting on the manuscript, and Mr. J Clare for assistance with field work and the preparation of the figures, and my wife Amy, whose unending patience and understanding have been invaluable.

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VERPA CONICA: A RARE MOREL FOUND IN TWO NEW YORKSHIRE VICE-COUNTIES (61 & 64) IN 1986

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Good illustrated descriptions of the ascomycete morel fungus *Verpa conica* can be found in Lange and Hora (1965) and in Phillips (1981). As *Verpa digitaliformis* (see later), the only Yorkshire records are from Mason and Grainger (1937) and were in VCs 62, 63 and 65. Bramley (1985) also gives a 1908 record from Masham (VC65). Mr Bramley says in a letter to us that he has never seen this fungus himself in Yorkshire. The way in which Mason and Grainger prepared their lists makes it impossible to say precisely where their VC62, 63 and 65 records were. However, Massee and Crossland (1905) give a record in VC62, in Forge Valley, near Scarborough, and in VC65 at Hermitage, Bedale in 1901. Dr Derek Reid has written to us to say that he regards the name of this fungus to be *Verpa conica,* not *V. digitaliformis.* Whether there are in fact two species is a problem; apparently they were originally distinguished on the basis of a narrow pedicellate attachment of the head (*V. conica)*, whereas *V. digitaliformis* has been reported as having a broad non-pedicellate attachment of the head, and to have slightly broader ascospores.

VC61 Record

One of us (MCC) found a number of specimen of *V. conica* on 11 May 1986 at Boynton Willowgarth, near Bridlington, on the YNU Spring Foray. Most were poor and stunted, and were under some large hawthorns (*Crataegus*) in loose soil with little other vegetation, near a stream. The site was possibly subject to flooding.

VC64 Record

Another of us (AG) and Mrs Freda Draper found a single specimen of *V. conica* on a sandy part of the bank of the River Wharfe in Strid Wood, Bolton Abbey on 13 May 1986. The brown, blunt, uneven head lacked the conical shape shown in the usual illustrations (Large & Hora 1965; Phillips 1981) but the creamy stem with very faint transverse lines of tiny scales agreed well with the published descriptions. The brown head was free at the edges and yellowish beneath. The fungus was growing on a moss-covered rock amongst butterbur (*Petasites hybridus*). The river had recently been in flood and the nearby butterbur heads were brown and shrivelled. Possibly the flooding

had affected the development of the fungus. Mr Bramley examined the specimen microscopically and considered that the asci, ascospores and paraphyses matched well with the published descriptions of *V. conica*.

Previous Records in Great Britain

It is clear (Reid 1977) that *V. conica* is quite a rare fungus, although there was a curious increase in records during the Spring of 1977. Apart from those given by Dr Reid in his paper, he has written to us to say that he has the following records: 1968 — Surrey, Newlands Corner; 1977 — 6 records from Warwickshire; 3 records from Huntingdonshire (Aversley Wood, Waresley Wood, Castor Hanglands); 1978 — Ruislip Common, Middlesex; 1979 — South Uist; 1980 — Glan-yr-Afon, Abergele, Clwyd, North Wales; 1983 — Silverdale, Lancashire; 1985, Inveraver, Scotland.

As can be seen from these sparse records, there does not, as yet, seem to have been another '*Verpa conica* year' since 1977. MCC has records of one specimen being found in Warwickshire in 1984, and one other specimen in the same county in 1985. He found the fungus in 1984 in Worcestershire, probably (see Reid 1977) the second known record for that county.

The causes of the sparseness of this fungus in most years await investigation, as does its curious apparent absence in many vice-counties of Great Britain. Meantime, good records from anywhere are of great interest; the time to look for it is very clear: our records fit with Dr Reid's earliest (March 22) and latest (May 23) dates of all known British records.

Acknowledgements

We would like to thank Dr T. F. Hering for checking Yorkshire records; Mr W. G. Bramley for checking his records and for microscopical work; Dr D. Reid for sending us his records and help regarding the name of the fungus.

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BOOK REVIEW

Wildest Britain by **Roland Smith**, with photography by **Mike Williams**. Pp. 224, numerous b/w & coloured illustrations, plus maps. 1986. £6.95 paperback.

This second edition of *Wildest Britain* can be highly commended as a visitor's guide to the ten National Parks of Britain. It is produced attractively and with great detail. The photography is splendid, in pleasantly natural colours and shows very clearly how hilly and rocky are many of the counties. It is most helpful in dealing with the best travel routes for walking and driving as well as supplying a list of useful tourist accommodation addresses. An added bonus at the end of each section is a list of Places to Visit and extra books to read which should assist the intending visitor. A most useful and interesting book for the serious traveller or the motorist just passing through.

MET

ORIBATID MITES (ACARI: CRYPTOSTIGMATA) FROM THE ISLE OF MAN

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Introduction

The mites of the Isle of Man are virtually unknown. The literature contains two records for Cryptostigmata, that of Michael (1888) who noted receipt of specimens of *Hermannia reticulata* from the island, and that of Bruce *et al* (1963) who listed *Hygroribates marinus* (= *Scutovertex spoofi*) from the sea shore. The catalogue presented here increases the number to 59 species, including 7 new records for the British Isles and 2 species new to science.

Collecting Locations

A. Lichen, moss and soil on a north facing rock outcrop, Glenmaye, near Peel (D. Knight, 1.1.86), n = 77.
B. Moss on ground, Glenmaye, near Peel (D. Knight, 1.1.86), n = 231.
C. Moss on rock (slate), Glenmaye, near Peel (D. Knight, 1.1.86), n = 35.
D. Moss on tree stump, Glenmaye, near Peel (D. Knight, 1.1.86), n = 184.
E. Moss on stone wall, the Raggatt Bridge on the A27 road, 1 mile south of Peel (D. Knight, 1.1.86), n = 64.
F. Mixed deciduous litter, the Raggatt Bridge on the A27 road, 1 mile south of Peel (D. Knight, 1.1.86), n = 5.
G. Boggy hollow, summit of South Barrule (530 m) (L. S. Garrad, 21.5.71), n = 743.
H. (wet place ?) at 80 m on the Calf of Man (L. S. Garrad, 10.6.69), n = 573.
I. Grass sod at 700 m just below summit of Snaefell (A. C. Garrad, 15.6.71), n = 282.

Population Abundances

Total oribatid densities per sample are given after the locality data above, but the mite species populations have also been given an arbitrary abundance index to provide some gauge of their importance relative to the other members of the oribatid community. Thus:

<1% of total oribatids in sample	= 1
1–5%	= 2
6–10%	= 3
11–15%	= 4
16–20%	= 5
>20%	= 6

Species List

New British records are marked with an asterisk.

Superfamily Phthiracaroidea

Family Phthiracaridae
Phthiracarus affinis (Hull, 1914). B2, H1.
Phthiracarus longulus (C. L. Koch, 1841). B2.

Superfamily Brachychthonoidea

Family Brachychthoniidae
Brachychthonius berlesei Willmann, 1928. I2.
Liochthonius brevis (Michael, 1888). I2.
Synchthonius crenulatus (Jacot, 1938). I1.

Superfamily Hypochthonoidea

Family Hypochthoniidae
Hypochthonius rufulus C. L. Koch, 1836. B1.

Superfamily Hermannoidea

Family Hermanniidae
Hermannia gibba (C. L. Koch, 1840). B6, C4.

Superfamily Nanhermannoidea

Family Nanhermanniidae
Nanhermannia coronata Berlese, 1913. G1, H6, I1.
**Nanhermannia sellnicki* Forsslund, 1958. H2.

Superfamily Nothroidea

Family Camisiidae
Platynothrus peltifer (C. L. Koch, 1839). G2, H1, I2.

Family Malaconothridae
Malaconothrus monodactylus (Michael, 1888). H6.
Trimalaconothrus novus Sellnick, 1921. G6.

Family Nothridae
Nothrus palustris C. L. Koch, 1839. B2.

Superfamily Carabodoidea

Family Carabodidae
Carabodes marginatus (Michael, 1884). I2.
Carabodes willmanni Bernini, 1975. I4.
Odontocepheus elongatus (Michael, 1879). D2.

Family Tectocepheidae
Tectocepheus velatus (Michael, 1880). I1.

Superfamily Eremaeoidea

Family Eremaeidae
Eremaeus oblongus C. L. Koch, 1836. A2, D1, E6.
Note: I have compared specimens of *Eremaeus oblongus* (C. L. Koch sensu Michael, 1879) from the Michael Collection of the British Museum (Natural History) with types of *Eremaeus silvestris* Forsslund, 1956 from the Svenske Naturhistoriska Riksmuseet, and conclude that they are conspecific. The two Swedish specimens have somewhat more slender sensillar capituli than the British material but this and other differences may be encompassed within the natural range of variation. I have also examined a number of specimens collected recently in Britain, and concur with the view of Gjelstrup and Solhøy (in press) that the species *Eremaeus oblongus* is rather variable. There is a certain amount of sexual dimorphism and variation resulting from the relative degree of sclerotization which accompanies aging. In some specimens, the development of the costular region can vary morphologically and also with orientation of the specimen. For instance, one of Michael's specimens clearly shows a transcostular ridge spanning the bases of the costulae. This variation casts doubt on the veracity of some other species of the genus, which needs careful revision.
Tricheremaeus serrata (Michael, 1885). A2.
Note: Not recorded from the British Isles since its description (Michael 1885, 1888).

Superfamily Liacaroidea

Family Astegistidae

Cultroribula juncta (Michael, 1885). A4.
(Fig. 1 A,B)

Note: Michael's (1885) description and figure of *Notaspis juncta* are not adequate to characterize the species properly. In particular, his description of the tarsi as being monodactylous is erroneous, an error which has been constantly repeated in the literature and which is especially serious since the species is the type of the genus *Cultroribula*. The tarsi are, in fact, heterotridactylous. Two slides of *Notaspis juncta* from the Michael Collection of the British Museum (Natural History) have been examined. That coded 1930.8.25.662 is selected as lectotype. Both specimens are somewhat obliquely aligned, and the following supplement to Michael's description and figure are therefore made from the Isle of Man specimens which exactly resemble the lectotype.

Dimensions: Mean length 253 μm (range 240–270)(n=6); mean width 157 μm (range 140–180) (n=6).

Prodorsum: Rostrum with a medial projection (i.e. with 2 lateral indentations) and flanked with 2 slight mounds which bear the rigid, smooth and pointed rostral setae (ro). Tutorium appearing in dorsal view as a ridge closely adpressed to the side of the proterosoma, but in lateral view as a plate which is rounded anteriorly. The lateral sides of the proterosoma ventral to the tutorial ridges reticulated. Pedotectum I pointed. Lamellae typical for the genus with long cusps, slightly expanded medially, which are raised well above the prodorsal surface but which do not extend to the rostral tip. Tips of cusps narrow and blunt and bearing smooth (or slightly roughened with cerotegument) lamellar setae (1a) which project beyond the rostral tip. Lamellae contiguous at about their mid–point (from where the cusps arise) and joined to the bothridia posteriorly. Bothridia robust cylinders only partly covered by the anterior rim of the notogaster. Sensilli (ss) with long, fusiform, slightly imbricate capituli which are at least as long as the thin stalk; only half, or less, of the stalks emerge from the mouths of the bothridia. Interlamellar setae (il) small, inconspicuous and situated close to the inner edge of the attached portion of the lamellae.

Notogaster: Notochaetae, frequently represented by alveoli, number 12 pairs. Visible setae are short, fine and smooth. Humeral extensions (which bear one pair of the visible notochaetae) are conspicuous, oblong in shape (the long axis attached to the notogaster) and with rounded corners. Notogastral integument smooth. Pore im conspicuous.

Venter: Ventral, anal and genital plates smooth. Anal and genital plates close together; anterior border of genital plate contiguous with posterior borders of epimera 4. Epimeral setal formula 2–1–2–4. Epimera 1 separated by a vertical sternal bar; epimera 2 coalesced; epimera 3 reduced and coalesced with epimera 4. Epimera 4 strongly areolated, epimera 1, 2 and 3 with weaker markings. Genital setae number 5 pairs; aggenital setae reaching lateral borders of genital plates and numbering 1 pair; anal setae 2 pairs (occasionally 3 setae may be present on one plate); adanal setae 3 pairs. All ventral setae, where present, smooth and fine.

Appendages: All legs heterotridactylous.

Family Ceratoppiidae

Ceratoppia bipilis (Hermann, 1804). B1.

Family Gustaviidae

Gustavia microcephala (Nicolet, 1855). B1.

Family Liacaridae

Adoristes poppei (Oudemans, 1906). F6.

Xenillus tegeocranus (Hermann, 1804). F5.

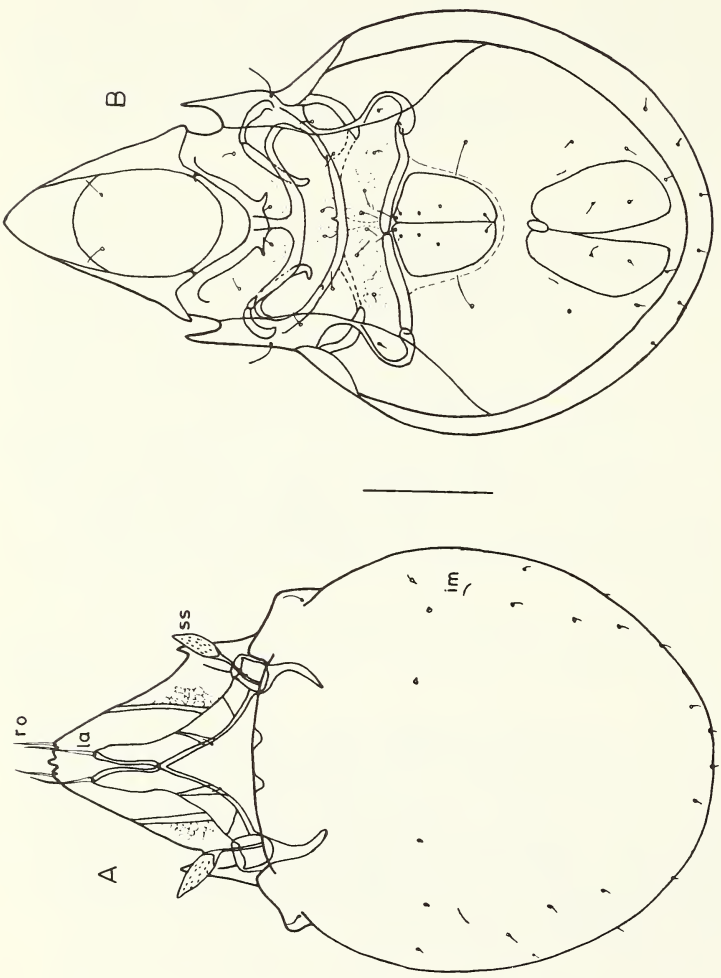

FIGURE 1
Cultroribula juncta (Michael, 1885)
A Dorsal view — B Ventral view
(scale bar = 50 μm)

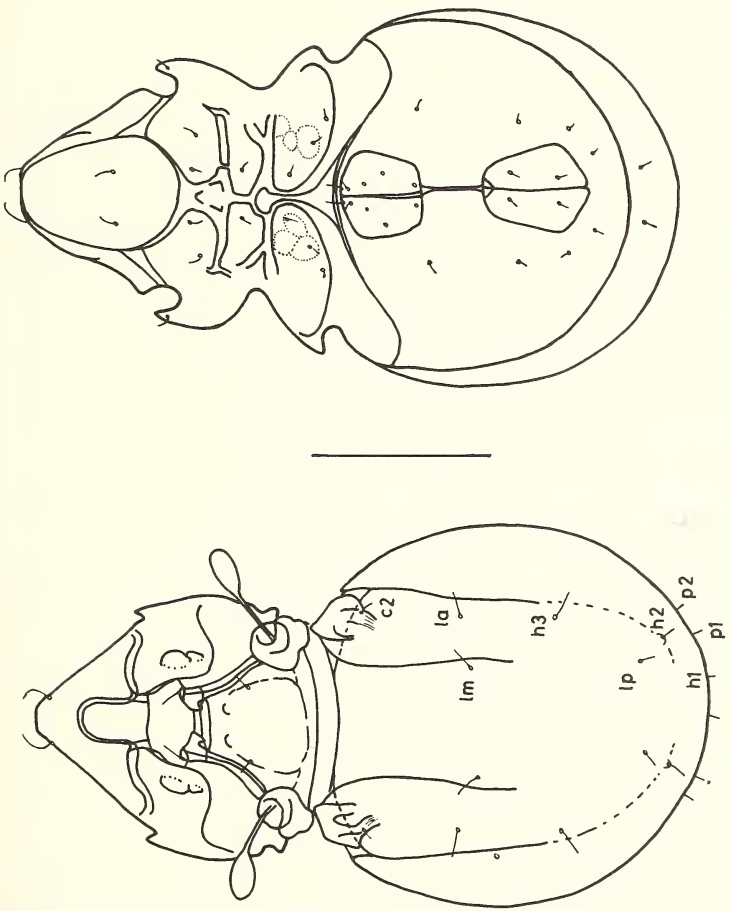

FIGURE 2
Quadroppia bellula n.sp.
A Dorsal view — B Ventral view
(scale bar = 50 μm)

Superfamily Oppioidea

Family Oppiidae

Berniniella sigma (Strenzke, 1951). B1, I2.
Dissorhina ornata (Oudemans, 1900). B6, C6, I6.
Lauroppia neerlandica (Oudemans, 1900). H1.
Medioppia obsoleta (Paoli, 1908). B4.
**Moritziella keilbachi* (Moritz, 1969). A2.
Moritziella unicarinata (Paoli, 1908). A3, C3, H2, I3.
**Multioppia neglecta* C. Perez-Inigo, 1969. E2.
Oppiella nova (Oudemans, 1902). B4, H5.
Quadroppia bellula n.sp. B2.
(Fig. 2A, B)

Dimensions: Mean length 187 μm (range 180–200) (n=3); mean width 117 μm (range 100–130) (n=3).

Prodorsum: Rostrum somewhat truncate; rostral setae fine, smooth and curved medially. Rostral sculpturing in the form of a horseshoe. Costulae and transcostula complex: junctions of costulae and transcostula each appearing to be overlain by a sclerotized triangular structure like a candle-snuffer, this gives the transcostula the appearance of being incomplete but in fact the transcostular ridge can be seen as a faint bar at a deeper level; junctions of costulae and transcostula extend somewhat anteriorly of transcostula. Area between rostral sculpture and transcostula faintly granulate; on each side of this is an irregular, sculptured zone bearing a delimited area within it. Lamellar setae smooth, short, fine and arising from the costular/transcostular junctions. Interlamellar setae also fine and smooth and inserted near the inner edges of costulae; just anterior to the interlamellar setae are two faint, round zones. Bothridia massive with large posterior condyles. Sensilli clavate with smooth capituli.

Notogaster: Notogaster with 9 pairs of smooth, fine notochaetae of medium length. Humeral extensions arising somewhat posteriorly of dorsosejugal suture. Cristae long, both pairs more-or-less extending to level of setae h3, the outermost lines showing faint extensions posterior to h3. Setae h2 inserted on small mounds.

Venter: Epimeral region structured as in Fig. 2B. Epimeral formula 3–1–3–0. Some sculpturing on epimera 3, which are characteristically separated from epimera 4 by a line. All ventral setae short and smooth; genital setae number 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs.

Types: The holotype (1987.4.1.1.) and 2 paratypes (1987.4.1.2–3) are deposited at the British Museum (Natural History), London.

* *Quadroppia maritalis* (Lions, 1982) comb. nov. B2.
(Quadroppia quadricarinata maritalis: Lions 1982; Minguez et al 1985)
Quadroppia quadricarinata (Michael, 1885). C3, I1.
(Quadroppia quadricarinata virginalis: Lions 1982; Minguez et al 1985; Subias and Rodriguez 1986)
(Fig. 3A, B)

Note: Michael's (1885) description and figure of *Notaspis quadricarinata* are sufficient to characterize the genus *Quadroppia*. However, since this time several new species and subspecies have been recorded (Lions 1982, Minguez et al 1985) and it is clearly necessary for a more up-to-date assessment of the type. One of the two slide preparations of *Notaspis quadricarinata* at the British Museum (Natural History) (coded 1930.8.25.434) has been marked 'lectotype K.-H. Forsslund'. This designation was never published but is formalized here. The following is a supplement to Michael's description and the figure is of the lectotype. The main difference seen from the original account is that the notochaetae are longer, more numerous and less stout than shown in Michael's paper. The nominate species most closely resembles *Q. quadricarinata virginalis* Lions, 1982.

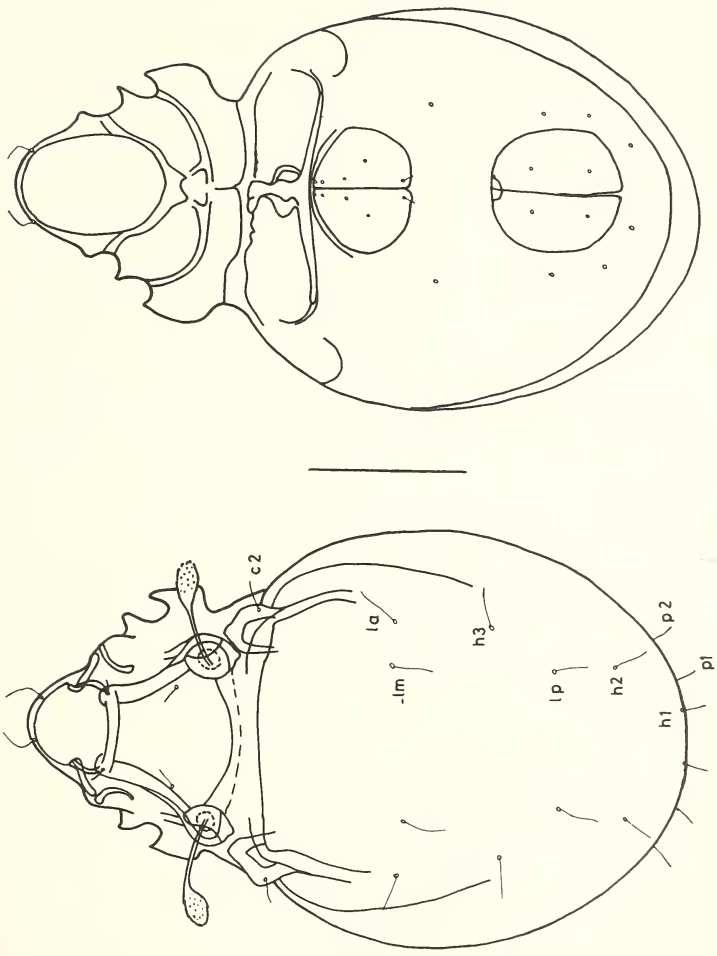

FIGURE 3
Quadroppia quadricarinata (Michael, 1885)
A Dorsal view — B Ventral view
(scale bar = 50 μm)

Dimensions of lectotype: Length 200 μm; width 130 μm.
Prodorsum: Rostrum broadly rounded, rostral setae fine and smooth, elbowed and directed medially; costulae and transcostula robust, encircling bothridia posteriorly, bearing short, fine, smooth lamellar setae at the junctions of costulae and transcostula. Conspicuous chitinous ridges set obliquely above junctions of costulae and transcostula, these are linked to costulae via further independent ridges which appear to be continuations of the transcostula; another curved ridge is situated posterior to both structures at a deeper level. Interlamellar setae small, fine and smooth. Bothridia robust, each with a small posterior tubercle. Sensilli clavate, with long pedicels; capituli covered in small spicules.
Notogaster: Humeral processes square, each bearing a seta. Notochaetae long, fine, smooth and numbering 9 pairs. Outer cristal lines reaching to the level of setae h3; inner, thicker, lines reaching to level of setae 13.
Venter: (Observed through dorsal surface) general facies as in Fig. 3B. Genital setae number 5 pairs, aggenital setae 1 pair, anal setae 2 pairs, adanal setae 3 pairs. Epimeral structure as in Fig. 3B, epimeral formula not determined. The British species of *Quadroppia* may be distinguished with the following key :

1 Rostral region of prodorsum with a horseshoe-shaped sculpture; junctions of costulae and transcostula overlain with thin, sclerotized plates giving the transcostula the appearance of being discontinuous . . . *bellula*
Rostral region of prodorsum without horseshoe-shaped sculpture; junctions of costulae and transcostula without accessory plates . . . 2

2 Transcostula broad and conspicuous; internal borders of epimera 3 and 4 sinuous and close together . . . *quadricarinata*
Transcostula narrow and faint; internal borders of epimera 3 and 4 straight and wide apart . . . *maritalis*

Family Banksinomidae
Banksinoma lanceolata (Michael, 1885). H2, I2.

Family Suctobelbidae
Suctobelba trigona (Michael, 1888). B2.
Suctobelbella nasalis (Forsslund, 1941). B2.
Suctobelbella sarekensis (Forsslund, 1941). B1.
Suctobelbella subcornigera (Forsslund, 1941). B2.
**Suctobelbella vera* Moritz, 1964. B1, I1.

Superfamily Ceratozetoidea

Family Ceratozetidae
**Ceratozetes peritus* Grandjean, 1953. B2, C2.
Edwardzetes edwardsi (Nicolet, 1855). E5.
Fuscozetes fuscipes (C. L. Koch, 1844). H1.
Humerobates rostrolamellatus Grandjean, 1936. D1.
Latilamellobates incisellus (Kramer, 1897). E2.
Sphaerozetes orbicularis (C. L. Koch, 1836). E2.

Family Chamobatidae
Chamobates borealis (Trägårdh, 1902). A6, I4.
Chamobates cuspidatus (Michael, 1884). B1, G1.

Family Euzetidae
Euzetes globulus (Nicolet, 1855). B2.

Superfamily Oribatelloidea

Family Achipteriidae
Achipteria coleoptrata (Linnaeus, 1758). H1.
Parachipteria willmanni van der Hammen, 1952. H1.

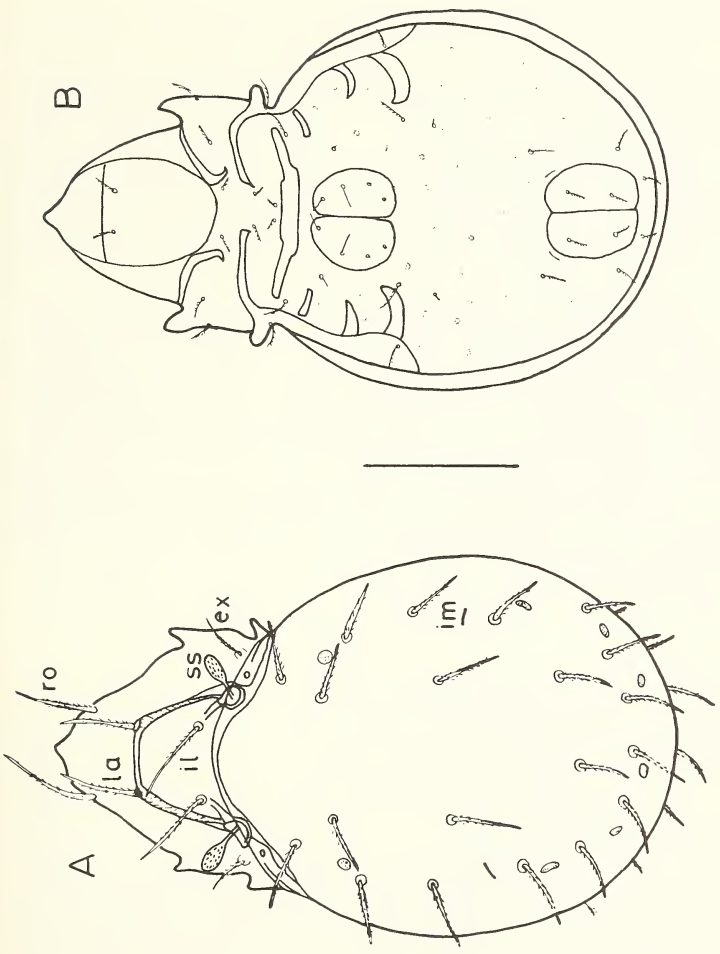

FIGURE 4
Zygoribatula knighti n.sp.
A Dorsal view — B Ventral view
(scale bar = 50 μm)

Superfamily Oribatuloidea

Family Oribatulidae

Liebstadia similis (Michael, 1888). H1, I4.

**Phauloppia longiporosa* Mahunka, 1982. D4, E2, I1.

Note: This species is probably widespread in the British Isles; I have collected it also from *Sedum/Armeria* tussocks in the supralittoral at Findochty, Banffshire.

Zygoribatula exilis (Nicolet, 1855). C2, D6.

Zygoribatula knighti n.sp. F5.

(Fig. 4A, B)

Dimensions: Length of unique specimen 410 μm; width 260 μm.

Prodorsum: Rostrum nipple-like; rostral setae long, setose and situated laterodorsally posterior to rostrum. Lamellae slightly narrower medially and joined by a narrow translamella. Lamellar setae on slight tubercles, long and setose. Interlamellar setae long and setose. Exobothridial setae long, finer than lamellar and interlamellar setae, and setose. Sensilli capitate, capituli covered in short spicules.

Notogaster: Notochaetae robust, setose and number 13 (14) pairs, each with a conspicuous insertion point. Humeral projections slight and rounded, each with a conspicuous alveolus which probably bore the 14th notochaetae. Dorsosejugal suture convex and entire. Notogaster finely punctate. Areae porosae small, round and numbering 4 pairs. Pore im conspicuous.

Venter: Region bearing anal and genital plates scattered with faint, subcuticular maculae, otherwise surfaces finely punctate. Apodemata 3 fused and situated just above genital plates, apodemata 1, 2 and 4 separate. Epimeral setal formula 3–2–2–3. Epimeral setae either somewhat setose or minute. Genital setae smooth and numbering 4 pairs; aggenital setae minute and numbering 1 pair; anal setae slightly setose and numbering 2 pairs; adanal setae slightly setose and numbering 3 pairs.

Appendages: Legs heterotridactylous.

Distinguishing features: The species most closely resembles *Zygoribatula lenticulata* Minguez & Subias, 1986 but differs in the following respects: (i) notochaetae 40 μm in length (60 in *Z. lenticulata*), (ii) longest epimeral setae about 10 μm (20 in *Z. lenticulata*), (iii) aggenital setae minute (about 20 μm in *Z. lenticulata*), (iv) epimera lacking reticulation.

Type: Holotype deposited at the British Museum (Natural History), London (1987.4.1.4).

Note added in proof: Since completing this description, 21 further specimens of *Z. knighti* have been examined (from moss on a sand dune, Freshwater West, Dyfed. 7.4.1987. coll. A. J. Luxton). It is now clear that the principal difference of this species from *Z. lenticulata* is in the size of the notochaetae which are consistently much shorter in *Z. knighti*. The discontinuous translamella and rugose notogastral microsculpture reported as appearing in some specimens of *Z. lenticulata* are also apparent in some specimens of *Z. knighti*.

The sizes of the ventral setae are variable in *Z. knighti* and epimeral reticulation (areolation) is also more or less well developed in the Welsh specimens. Humeral setae (subequal in length to the other notochaetae) are conspicuous. Mean dimensions and ranges are as follows: females 451 μm in length (440–470)(n=13), 316 μm in width (300–340)(n=13); males 395 μm in length (380–410)(n=8), 271 μm in width (250–290)(n=8).

Two female and two male syntypes from this collection have been deposited with the holotype at the British Museum (Natural History), London.

Family Scheloribatidae

Scheloribates laevigatus (C. L. Koch, 1836). E5.

Superfamily Passalozetoidea

Family Scutoverticidae

Scutovertex sculptus Michael, 1879. E6.

Abstract

59 species of oribatids (including 7 new British records and 2 species new to science) are recorded from moss, soil, leaf litter or the sea shore at various localities on the Isle of Man. *Eremaeus silvestris* Forsslund, 1956 is declared a junior synonym of *E. oblongus* C. L. Koch, 1836. Lectotypes are designated, and redescriptions given, for *Cultroribula juncta* (Michael, 1885) and *Quadroppia quadricarinata* (Michael, 1885). A key to the British species of *Quadroppia* is provided.

Acknowledgements

I am most grateful to David Knight, Matt Colloff and Edward Seyd for presenting the samples on which this paper is based. My thanks also to Dr L. Subias (University of Madrid) for identifying three of the oppiids and lending the types of *Zygoribatula lenticulata*, Torbjörn Kronestedt (Riksmuseum, Stockholm) for lending types of *Eremaeus silvestris*, and Anne Baker (British Museum, London) for arranging the loan of *Eremaeus oblongus*, *Cultroribula juncta* and *Quadroppia quadricarinata*.

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BOOK REVIEWS

Collins Guide to the Birds of Prey of Britain and Europe, North Africa and the Middle East by **Benny Gensbol**, with illustrations by **Bjarne Bertel**. Pp. 387, with many colour and black and white photographs, maps and drawings. Collins, 1986. £14.95.

This is a book for the specialist rather than the general birdwatcher, dealing in some detail with the distribution, population trends, migration, habitat, breeding biology, food and feeding methods of some forty-six species of raptors, including vultures, which breed in the Western Palaearctic.

The amount of detailed, up-to-date information provided for each species is remarkable, and the complementary photographs, many of them taken by the author, are very adequate; many I have not seen published before. Perhaps of most immediate value will be the distribution maps for each species, which are of a good size and can be interpreted at a glance.

The accompanying chapters on the history of raptor persecution in Europe and biological adaptation are well researched and clearly presented, and there is a very comprehensive bibliography.

The author is to be congratulated on his industry and scholarship in producing a most useful addition to the libraries of the large and rapidly growing numbers of raptor enthusiasts.

MD

Distribution and Status of Bats in Europe by **R. E. Stebbings** and **Francesca Griffith**. Pp. 142, including 19 black-and-white plates, 31 maps and 2 tables. Institute of Terrestrial Ecology, NERC. 1986. £5.00 (+ postage £1.10) from Institute of Terrestrial Ecology, Monks Wood Experimental Station, Abbots Ripton, Huntingdon PE17 2LS.

A considerable degree of effort and international collaboration has gone into the production of this book, the only up-to-date account of the distribution and status of European bats available. All 31 species of bat found in Europe are included, with data collected from 27 countries. A European distribution map is provided for each species, together with sections on distribution, habitat, population, threats and conservation measures. Many species are illustrated by black and white photographs and there is an extensive bibliography.

The book paints a depressing picture of the widespread decline of many European bat species and highlights how little is known about the causes or about the habitat requirements of these fascinating but enigmatic animals.

AAW

Breeding Butterflies and Moths. A Practical Handbook for British and European Species by **Ekkehard Friedrich** (translated by Steven Whitebread), edited by **A. M. Emmet**. Pp. 176, with 47 text figs. Harley Books, Colchester. 1986. £20.00 hardback, £9.95 paperback.

This volume is largely based on the second edition of Friedrich's *Handbuch der Schmetterlingszucht: Eur. Arten* which has been ably translated from the German by Steven Whitebread, himself an experienced lepidopterist. However this is more than a translation, useful as that would have been, for much additional material has been incorporated, particularly concerning the Geometridae and 'microlepidoptera' and comments particularly relevant to the British reader have been added throughout.

An introductory chapter entitled 'How to Use this Book' begins 'It may be assumed that whoever uses this book will also possess entomological works for identification. Therefore, the foodplants of the caterpillar are not listed where this information has previously been well documented.' It follows, therefore, that this book complements existing literature by providing information not adequately covered in other works. The nomenclature adopted for the British species is that of Kloet & Hincks with subsequent amendments; additionally, the English names of South have been provided for the British butterflies and larger moths and those of Higgins and Riley for the non-British butterflies.

Part one, 'Basic Principles' provides a comprehensive introduction (33 pp.) to rearing techniques, with every conceivable aspect of housing the adult insects, oviposition, treatment of every stage, equipment required and techniques to be employed explained clearly and concisely. A chapter on conservation, recommendations regarding re-introductions and species subject to legal protection conclude this section.

Part two is the meat of this book, the rearing descriptions. They are grouped into three sections, butterflies, macrolepidoptera (including the Hepialidae, Cossidae, Zygaenidae & Sesiidae) and microlepidoptera (including the Psychidae which has been transferred from the macrolepidoptera in accordance with British practice). This somewhat unscientific division is a practical way of dealing with the species concerned and should find general acceptance. The rearing hints are dealt with variously by species, species group or genus as appropriate, the information provided being exactly that required to guide the breeder through the many pitfalls. The treatment of the butterflies and the majority of the macrolepidoptera is that of Friedrich, while that of the Geometridae was felt to be inadequate so far as the British fauna was concerned and Mr J. Reid has provided much additional material which has integrated well with the existing text.

As the section dealing with the microlepidoptera in the original work was very brief, an enlarged contribution by Lt Col A. M. Emmet dealing entirely with the British fauna has been substituted, although this does include the original text on the Psychidae and

the non-British Thyrididae. This information, when used in conjunction with that in *A Field Guide to the Smaller British Lepidoptera* (Emmet, 1979), should resolve most problems in rearing microlepidoptera.

This book is a compendium of invaluable information for all whose interest in Lepidoptera extends beyond cabinet specimens, and the publisher, translator and editor are to be congratulated on the quality of this publication. Although the paperback edition with laminated covers offers excellent value, the constant use this book is likely to receive would make an investment in the hardback edition worthwhile.

HEB

A Hierarchical Concept of Ecosystems by **R. V. O'Neill, D. L. De Angelos, J. B. Waide** and **T. F. H. Allen**. Pp. vii + 253, including numerous line drawings. Monographs in Population Biology No. 23. Princeton University Press, New Jersey. 1986. £30.10 hardback, £9.70 paperback.

This is a monograph aimed at the researcher in ecology and related disciplines, in which the authors propose a new way of considering ecosystems. They review previous concepts of ecosystems, and how these have tended to become divided into those that study organisms, the population/community approach, and those that study processes, the functional approach. Their argument is that differences between these points of view simply reflect the study of different aspects of the same problem at different scales and in different ways, and that both can instead be understood in terms of hierarchies of organisation either of individual entities or of process rates respectively. They support their thesis with both theoretical and observational evidence.

The book contains some interesting ideas, and the authors suggest that their proposals will help integrate the conceptual framework of various schools of ecology. However, I felt that this laudable aim might be somewhat impeded by the rather difficult style in which the book is written, which might deter some ecologists from reading the book.

WHGH

The Wild Places of Britain by **David Bellamy**. Pp. 192, with the author's watercolour illustrations. Webb & Bower (Michael Joseph). 1986. £12.95.

Imagine the most desolate places in Britain under the most atrocious weather conditions — these are the wild places that most attract the artist David Bellamy (not to be confused with his botanist namesake). He finds watercolour best captures the subtle moods he wants to convey and chooses to paint in rain, blizzards and gales when the mountain scenery is at its most atmospheric — in his words, 'driving wind in the face can enliven one's response to nature'. He vividly describes both the hazards and the appalling discomforts he endured, and the rewards that made these expeditions into the high places so worthwhile. The result is a book that is both absorbing to read and a visual delight.

DAC

Floreat Hibernia. A bio-bibliography of Robert Lloyd Praeger 1865–1953 by **Timothy Collins**. Pp. xiv + 151, including numerous b/w photographs and figures. 1985. Royal Dublin Society. IR£12.00.

This book, as the author admits, is not a definitive biography; however, Timothy Collins is to be congratulated on successfully portraying Praeger's enthusiasms and achievements.

Praeger was a most influential figure, dominating the natural history movement in Ireland for more than half a century. The list of his published work is impressive, both in terms of its quantity (Collins lists some 789 items) and coverage (archaeology, topography, geology and a wide range of biological subjects), but he will best be remembered for his *Irish Topographical Botany* (1901), *A Tourist's Flora of the West of Ireland* (1909), *The Botanist in Ireland* (1934), *The Way That I Went* (1937), and his researches into the Irish flora. Praeger's achievements were similarly impressive and far

too numerous to recount here; suffice it to say that he was a co-founder of *The Irish Naturalist* (later *The Irish Naturalists' Journal*), founder member of both the Library Association of Ireland and the National Trust for Ireland, and a driving force behind the innovative Clare Island Survey. He held numerous prestigious offices and received several honours during his long lifetime.

The biographical section of this book is complemented by many delightful and evocative period photographs, and supported by useful reference lists and an index. The bibliographical section is usefully cross-referenced to subjects, persons and serials. The final appendix lists the contents of the Praeger Collection in the possession of the Royal Irish Academy.

MRDS

The Landscape of the Welsh Marches by **Trevor Rowley**. Pp. 257, with 80 plates and 12 figures. Michael Joseph. 1986. £14.95.

Between the realities of the Saxon east and the mysteries of the Celtic west lies a land half English and half Welsh. It has held a magic sway over many people over many years: A. E. Housman was one of its chief apologists when he wrote lines such as 'In valleys of springs and rivers,/by Ony and Teme and Clun,/The country for easy livers,/The quietest under the sun'. Now, Trevor Rowley has added another, and very satisfying account of the Welsh Marches. He tells us how the term 'march' comes from the Anglo-Saxon *mearc*, meaning boundary, and how Offa, King of Mercia, built his Dyke there. This great rampart, from north to south, from sea to sea, is the most extensive linear earthwork in Britain and provides both a backbone for the Marches and tangible evidence of a negotiated Dark Age political settlement between English and Welsh. The book starts by describing the physiography of the Marches and then leads the reader through the human history of the land from the Old Stone Age, the Roman impact, the Saxon invasions, the Norman occupation through the Industrial Revolution to the present century. There is much scholarly detail and each chapter lists 'places to visit', not in the trite style of the average guidebook, but written in a genuinely informative manner. I wish I had had this book in years past when I drove regularly from Aberystwyth eastwards through Montgomery: Rowley's description of that town would have induced me to break my onward rush to spend some time there. The book is profusely illustrated with 80 monochrome plates and 12 well-executed maps and plans. I unhesitatingly recommend the work to anyone with an interest in the Welsh Marches, that 'nostalgic landscape of deeply engraved leafy lanes'.

BED

Walkers by **Miles Jebb**. Pp. xii + 202. Constable. 1986. £10.95.

Walking is natural and universal and people have walked for innumerable reasons and in countless ways. The author has chosen 10 themes to demonstrate the great diversity of walkers past and present: Pilgrims, Tourers, Romantics, Athletes, Intellectuals, Discoverers, Tramps, Ramblers and Backpackers. Throughout he has tried to focus on the physical and mental experience of the walk itself, examining blisters, peering into rucksacks and probing morale. Thomas Coryate, George Brown, Wordsworth and Coleridge, R. L. Stevenson, Hilaire Belloc, Ramsay MacDonald, John Hillaby and Jean Jacques Rousseau are just a few of the many people whose walking styles and motives he discusses. In addition, he gives us an insight into how walking integrated into social life in the past by reference to English fiction. Concerning supposedly factual accounts of great walks, some are greatly exaggerated e.g. that of Captain John Dundas Cochrane, in which he claimed to have accomplished great distances in the Arctic Circle in atrocious conditions with unbelievable rapidity; Miles Jebb is quick to suggest where this might be the case.

This is an informative, readable, entertaining and well-written account which the reviewer recommends whole-heartedly to all who indulge in this pursuit which demands not only physical skills and endurance, but also correct mental attitudes, such as independence, sense of purpose, determination and unpretentiousness. It will, however, perhaps be appreciated by most as a book for 'dipping into'.

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The Naturalist

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William Backhouse: Entomologist, Ornithologist and Horticulturalist — *Peter Davis*

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JAN 19 1988

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

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Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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HISTORICAL RECORDS OF THE SWALLOWTAIL BUTTERFLY (*PAPILIO MACHAON* L.) IN YORKSHIRE

W. E. RIMINGTON

There appear to be two original sources for records of the swallowtail butterfly in Yorkshire. The first of these originates almost certainly from a letter written by John Ray in 1670, and the second — and only substantial record — is contained in *Lepidoptera Britannica* (Haworth 1803), the locality referred to being Beverley. These two records are here considered, together with a necessary account of the habits of *P. machaon*.

The species has almost certainly existed in two forms in England, the vast majority of the early records referring to the continental subspecies *bigeneratus* Verity rather than to the exclusively English subspecies *britannicus* Seitz (Bretherton 1951). *P. machaon bigeneratus* apart from sporadic occurrences due to immigration in favourable periods, became virtually extinct in England in the early nineteenth century. Its distribution here was always southerly, historically recorded colonies rarely extending much further north than the Severn. On the Continent the insect frequents a variety of habitats, occurs to altitudes of 2000 metres and utilizes a variety of foodplants, mostly umbelliferae. It is unquestionably migratory and according to Warren (1951) is obligately bivoltine. Available evidence indicates that in England its habits were similar. *P. machaon britannicus* is in contrast a sedentary fenland insect whose larvae feed almost exclusively on milk-parsley (*Peucedanum palustre* (L.) Moench). It is obligately bivoltine. Single examples of the two subspecies are sometimes separable only with difficulty.

The following letter (quoted in Lankester 1848) headed 'Middleton 17.7.1670' was written by John Ray to his friend John Willughby. 'This summer we found the same horned Eruca which you and I observed about Montpelier feeding on F. tortuosum. Here it was found on common fennel. It hath already undergone the first change into a chrysalis and we hope it will come out a butterfly before winter.' It seems certain that this letter is the source of all subsequent references to Middleton as a Yorkshire locality for *P. machaon*, both Kirby and Spence (1828) who actually quote the letter and Dale (1902) referring to 'Middleton in Yorkshire' as a locality for the butterfly. It is equally certain however that the letter heading 'Middleton' refers to Middleton Hall in Warwickshire, Willughby's residence, where Ray frequently stayed and that the above authors mistake 'Middleton' for Middleton-on-the-Wolds which lies some ten miles from Beverley, the locality for *P. machaon* given by Haworth (1803). Ray's only association with Beverley seems to have been a brief visit during his first itinerary in 1658 during which little or no entomology appears to have been performed. Ray's later comment made to his friend James Petiver (Wilkinson 1981) that he had seen the swallowtail in the 'north of England' is an intriguing but frustratingly obscure remark to which no local significance can be attached. It seems therefore that no reasonable grounds exist for associating Ray's observation with any locality in Yorkshire.

Haworth (1803) in his famous reference to the swallowtail in Yorkshire wrote 'An ingenious and practical Aurelian friend has informed me that he took two sorts of swallow-tailed *Papilios* near Beverley in Yorkshire five and twenty years ago but no specimen of them are now extant, a fire which unhappily destroyed a great part of his property having consumed them likewise. Now, as we have only two swallow-tailed species in Great Britain, one of the above in all probability was *Podalirius*. I know machaon (the common swallow-tailed Papilio) breeds near Beverley yet; and my brother in law R. Scales of Walworth near London possesses a specimen of it which was taken there about seven years since'.

Rylands (1839) supplies the name of Haworth's friend as 'Mr Rippon of York'.

Although taken seriously by Porritt (1883) and by all other authors this record is totally rejected by Allan (1958). Allan's argument ran briefly thus:

1. By implication Haworth's friend was unreliable since the scarce swallowtail (*Iphiclides podalirius* L.) was neither a northerly insect on the Continent nor was it a migrant and would not therefore be found near to Beverley.
2. Since the labelling of specimens in collections was not then customary Scales' recollections were unreliable.
3. Haworth's only evidence that it 'breeds near Beverley yet' was a single specimen taken about 1795, whereas his friend Peter Watson who lived in Hull all his life could have told him of any butterfly in the district in 1803. Haworth lived in London from around 1793 to 1812.

The significant personalities involved appear to be John Rippon, Robert Scales, Peter Watson and Haworth. Of John Rippon I have discovered little other than that he lived from 1721 to 1805, was a member of the third Aurelian Society and was the first recorder of the cranefly *Ctenophora flaveolata* Fabricius in Britain. Watson 1761–1830, Scales and Haworth 1760–1833 all lived in Hull for varying periods of time and were magnificent entomologists. Both Watson and Haworth were also highly proficient botanists. All were members of the third Aurelian Society founded by Haworth in 1801 and were on close personal terms.

Allan's dismissal of Rippon's evidence is unreasonable for Rippon, who could certainly recognize *P. machaon*, is not recorded as stating that he had seen 'podalirius'. It is not impossible that his second 'swallow-tailed Papilio' was a recognizably distinct variety of *P. machaon* such as ab. *aurantiaca* Speyer. Moreover distribution patterns are not static. Curtis (1836) discussing the range of '*P. podalirius*' writes 'M. Hoffman assures me that it is found even at Hamburg'. The status of *I. podalirius* as a British insect was then in dispute, but Rylands (*loc cit*) after consideration of the available evidence inclined to the view that it was.

Allan's second point concerning the labelling of specimens in old collections is true but it is almost inconceivable that Scales would mistake such a novelty as a specimen of *P. machaon* from Beverley.

The third point simply does not make sense for Watson quite probably was the entomologist who informed Haworth that *P. machaon* 'breeds near Beverley yet'; moreover the implication is that his correspondent had actually seen the larva which was then well known. Overlooked by Allan is the information given by Haworth (*Lepidoptera Britannica*, p. 16) that Watson had taken 'in the county of York' and sent to him, two specimens of the large heath butterfly (*Coenonympha tullia* Müller). Stephens (1828) gives the locality as Beverley. The important point here is that the captures were made at Beverley between Haworth's departure for London around 1793 and the publication of *Lepidoptera Britannica* in 1803. *C. tullia* was first publicly noticed by Lewin (1795). Interestingly Watson also sent Haworth specimens of the rare mazarine blue butterfly (*Cyaniris semiargus* Rott.).

Nor was Watson the only naturalist to work the Beverley marshes at this time for those two distinguished botanists Christopher Machell — the first recorder of milk-parsley at Beverley in 1796 (Teesdale 1800) — and Robert Teesdale visited the marshes on several occasions during the 1790s. Significantly, Teesdale — who described the plant as abundant at Beverley — then lived near to Haworth at Little Chelsea.

It is reasonable to assume that this highly competent group of naturalists, which probably also included Rippon and Scales were in regular communication with and in a position to supply information to Haworth whose integrity and entomological judgement have to my knowledge never been questioned.

The basic suitability of the area 'near to Beverley' as a habitat for *P.m. britannicus* may be assessed by reference to Sheppard (1957, 1958) who described the complex history of the drainage of the once extensive wetlands of Holderness and the Hull Valley. Sheppard indicates that by 1800 the meres of Holderness to the east of the Hull Valley had virtually disappeared. In the Hull Valley itself despite the drainage scheme

of 1764, areas to the north of Beverley still contained considerable areas of wetland comprised of fresh water meres, carrs and land under prolonged flood. The western part of this remaining area was effectively drained by the 1798 scheme while to the north east a few meres notably Tickton and Leven survived into the early part of the nineteenth century. We know that milk parsley was abundant at Beverley in 1796 and may safely assume that although in decline the locality remained potentially suitable for *P.m. britannicus* around the year 1800. To the south of Beverley the area was largely salt marsh and was therefore inimical to the growth of milk-parsley.

Lees (1888) described milk-parsley as 'common in south Lincolnshire and Yorkshire swamps' at the turn of the century. It is not difficult to imagine in bygone days this vast area of marshland stretching from north of the Humber almost to the Wash, abundant with the plant and supporting thriving colonies of the swallowtail butterfly. These colonies would then have formed the link between those to this day extant in East Anglia and those which by Haworth's day had become relict 'near to Beverley'.

Why however was *P. machaon* not recorded more frequently subsequent to Rippon's alleged capture in 1778? The answer to this question probably lies in poor communications, the declining habitat and the sedentary nature of the butterfly. *P.m. britannicus* strays very rarely. Hall (*pers. comm.*) states that in a 1975 study at Wicken fen, of 300 adults released, despite appeals for observation only two were reported outside the fen. Moreover, the butterfly was on reaching adjacent territory frequently seen to turn back, the implication for sightings outside the natural habitat being apparent. At Beverley sighting opportunities within the swamps must also have declined in parallel with the deteriorating habitat. It is also a mistake to assume that Haworth, Watson or Scales knew of the captures until much later than 1778 for Rippon was by then 57 years of age and almost certainly living in York, while Haworth and Watson were youths and living in Hull. Furthermore in the absence of entomological journals opportunities for the dissemination of information were virtually absent and we may reflect that but for Haworth's remark no records of Beverley *P. machaon* would now exist. A most important parallel exists here in the case of the butterfly in the East Anglian fens for there it was seemingly known to the Norfolk naturalist William Arderon around 1750 (Whalley 1971) but remained in obscurity until the early nineteenth century.

The paucity of records for *P. machaon* at Beverley is I believe no more surprising than the belated discovery there or at Cottingham of the large heath or that milk-parsley escaped discovery by a botanist of Watson's calibre at Beverley. For a man in ignorance of the peculiar foodplant and habitat requirements of *P.m. britannicus* and of the occurrence at Beverley of milk-parsley John Rippon chose his locality with remarkable precision.

I have assumed in this paper that 'near to Beverley' referred to the Beverley marshes and that the records relate to subspecies *britannicus* and not to subspecies *bigeneratus* of *P. machaon*. I consider these assumptions to be justified in view of the known distribution and habits of the two subspecies and the concentration of records about the available habitat of the Beverley marshes. For the same reasons I do not believe that statements that the records refer to strays (Jackson 1980) or to bred releases are correct.

It is my belief that these early records refer to *P. machaon britannicus* and that they represented at Beverley the last dwindling remnants of a population once common throughout the extensive marshlands of Yorkshire and Lincolnshire.

Acknowledgements

My thanks are due to Miss Eva Crackles and to Dr W. A. Sledge for information relating to the characteristics and Yorkshire habitats of *P. palustre*, to Mrs M. L. Hall for information on the habits of *P. machaon* in Norfolk, to Dr A. Irwin for drawing my attention to William Arderon of Norfolk and finally to Mr Peter Skidmore for his enthusiastic assistance with many aspects of this paper.

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BOOK REVIEW

The New Forest by **Colin R. Tubbs**. Pp. 300 (including diagrams and b/w plates), plus 8 pages of colour photographs. New Naturalist, Collins. 1986. £22.50 hardback, £9.95 paperback.

The New Forest lives on, a valuable reminder of the once majestic forests which clothed so much of England and of which so little now remains. It is therefore all the more important to chronicle not only long-term but also short-term changes to this unique asset, which contains both nationally and internationally important habitats.

Colin Tubbs provides a most readable insight into the Forest's past and present structure and composition of its plants and animals, and the impact of man upon its delicate ecological balance. Although it seems ungrateful to cavil, one could wish, however, that his handling of those groups with which he is evidently less familiar, such as cryptogamic plants, had been checked, at least at proof stage, by a second opinion, since there are a disquietingly high number of spelling/typographical errors, particularly where Latin nomenclature is involved. His definitions are particularly weak, an outstanding example being his attempt to define cryptogam (here given as cryptogram!) on page 148. Any future reprint should at least supply an errata list — the publisher cannot even spell 'ecological' correctly on the dust-jacket!

Nevertheless, this is a most interesting work, which will be enjoyed by many.

MRDS

WILLIAM BACKHOUSE (1807–1869) OF ST JOHN'S HALL, WOLSINGHAM: ENTOMOLOGIST, ORNITHOLOGIST AND HORTICULTURALIST

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Introduction

The complex genealogy of the Backhouse family has been documented by Foster (1894), who traced the lines of descent from John Backhouse (d. 1691) of Moss-side, Yealand Redman, near Carnforth in Lancashire. A staunch Quaker, he was imprisoned in Lancaster Castle for his beliefs in 1661. The link with the north-east of England from these Lancastrian beginnings was via John Backhouse's great-grandson, James Backhouse (1721–1798), who moved to Darlington, Co. Durham, in 1746 and established himself as a flax-dresser and linen manufacturer, in partnership with his father-in-law, Jonathan Hedley (Anon, 1918). Later, in 1774, with his sons Jonathan and James, he founded the Backhouse Bank. According to Raistrick (1968) 'the bank became one of the most stable influences in the finance of northern business, surviving several crises in which many other local banks failed.' From this time on the Backhouses were involved in the fields of banking, commerce, industry and politics; their success in accumulating wealth provided the opportunity for travel, and a measure of leisure time in which to pursue other interests. Quakers were advised not to take part in 'vain sports' (Queries and Advices 1791);[1] although outdoor recreation was permissible, it was largely restricted to country walks which 'should be a subject of observation and reflection'. It was inevitable that this edict led to an interest in the natural world in the Quaker community, and many of them were to become outstanding naturalists in the nineteenth century.[2] A number of members of the Backhouse family feature amongst them; perhaps the best known and respected was James Backhouse (1794–1869) of York, who studied the flora of Australia from 1831–1838, developed one of the best known nurseries in England at York, and discovered many of the rare plants of Teesdale with his son, James (1825–1890). James senior's cousin William Backhouse (1779–1844), grandson of James Backhouse the first banker, was also a botanist of some repute. He was a correspondent of the Newcastle botanist N. J. Winch (1768–1838), supplying him with lists of the rare plants of Co. Durham,[3] and exchanging specimens with him. William Backhouse was acknowledged as a source of information in Winch, Thornhill and Waugh, *The Botanist's Guide through the Counties of Northumberland and Durham* (1805, 1807) and in Winch's *Flora of Northumberland and Durham* (1831). He had a special interest in grasses and mosses, and corresponded with many well-known botanists, including James Janson (1784–1821), Edward Robson (1763–1813), William Brunton (1775–1806), Rev. James Dalton (1764–1843) and George Don (1764–1814). Baker (1903) comments that William Backhouse senior botanized mainly around Darlington and Seaton Carew, that he discovered *Ranunculus parviflorus* near Darlington at its most northern locality in England, and sent specimens of *Bromus arvensis* to Sowerby. He died suddenly at a Friends Meeting in Darlington in June 1844.[4] Backhouse's plant collection was considered of some significance; it was unfortunately destroyed by fire, along with many other notable herbaria, when on loan to J. G. Baker in 1865.[5]

William Backhouse (1807–1869)

William Backhouse senior had two sons and three daughters; the eldest son, William (Fig. 1), was to continue the family interest in botany, become a competent entomologist, ornithologist, geologist and meteorologist, and excel as a breeder of the genus *Narcissus*. Born in 1807, little is known of his early life and education; it is probable that he attended Quaker schools in York.

A branch of the Backhouse Bank was established in Newcastle in 1825 (Phillips, 1894); it was here that William junior gained his first experience of the business world. He was eventually to become the owner of large estates in County Durham, having shares in many business ventures, including railway companies, iron-works, gas-works, foundries and saw-mills. He was also prominent in public service: he was Chairman of the Darlington and Stockton Board of Health, served as a Guardian of the poor and a Waywarden, and was active in local Temperance and Bible Societies.

FIGURE 1
William Backhouse (1807–1869)

The Dean Street, Newcastle, branch of the Backhouse Bank operated until 1836; during his time in Newcastle William Backhouse became involved in natural history circles — he came to know N. J. Winch, possibly through his father in the first instance — an interest which resulted in him becoming a founder member of The Natural History Society of Northumberland, Durham and Newcastle upon Tyne in 1829.[6] Joining the Society had another benefit: through it he met J. H. Fryer, a local expert in mollusca, whose daughter Amelia he married in 1833. Although William was to move back to Darlington, he maintained a close link with the Newcastle naturalists, and is listed as a member of the Tyneside Naturalists' Field Club in 1847.

William's activities as a field botanist are less noteworthy than his father's. Other than

a few plant specimens (which may have been annotated 'W. B. jun'. in error) in the Winch herbarium in the Hancock Museum, Newcastle, there is little to prove more than a passing interest. As an entomologist however, he specialized in Lepidoptera, and made extensive notes on the Lepidoptera of Dryderdale and Shull — Backhouse estates in Durham. William's records were incorporated into a *Catalogue of the Lepidoptera of Northumberland and Durham* by J. E. Robson (1902). For example, he provided Robson with the first record for Camberwell Beauty, *Nymphalis antiopa*, c. 1820 at Seaton Carew on the Durham coast, and found the Large Heath *Coenonympha tullia* near Seaton Carew. Robson states in the introduction to his Catalogue: 'I was entrusted with the whole of the entomological lists and notes of the late Wm. Backhouse, of Shotley, which I have largely drawn upon. As they refer to other orders as well as Lepidoptera, I propose, when this Catalogue is completed, to place them with the Museum authorities at Newcastle, as some of them may be useful at a future time if lists of other orders should be prepared'. The notes cannot be traced; from Robson's statement it is evident that Backhouse had wide entomological interests which had begun in his teens.

Further evidence of Backhouse's interest in insects, particularly moths and butterflies, is found in his correspondence with Henry Tibbats Stainton (1822–1892). Letters from William Backhouse in the Stainton Correspondence at the British Museum (Natural History) cover the period 1857–1867, and refer mainly to subscriptions for Stainton's *The Natural History of the Tineina* (Van Voorst, London, 1855–1873) and *List of British Lepidoptera . . . arranged as in the Manual of British butterflies and moths* (Van Voorst, London, 1857–1859). Backhouse evidently sent specimens to Stainton for identification, and offered some for incorporation into his collections. Reference is also made to '. . . my Friend Geo. Wailes'. George Wailes (1802–1882) was a Newcastle solicitor, a founder member of the Natural History Society of Northumberland, Durham and Newcastle upon Tyne, and President of the Tyneside Naturalists' Field Club in 1861. He published a *Catalogue of the Lepidoptera of Northumberland and Durham* in the latter's *Transactions* (7: 189–234), and contributed Lepidoptera records to Stainton's *Manual*. Another northern contributor to the *Manual* was a contemporary of William Backhouse, John Sang, the Darlington entomologist, regarded by Dunn (1983) as 'probably the finest lepidopterist the North East has ever produced'. The records in Stainton's Manual suffixed 'Da' were supplied by him. There can be little doubt that Backhouse and Sang must have corresponded, and even collected together. Backhouse was a competent watercolourist, and produced some pleasing representations (Fig. 2) of lepidoptera and their larvae.[7] Interestingly, Robson (1902) states '. . . among Mr. Backhouse's papers I found three water colour figures of an immature larva of this species [the Dark Tussock, *Dasychira fascelina*]marked "on ling, 13.5.59 fixed for casting it's [*sic*] skin".'

His fascination with birds must have developed at an early age. A manuscript catalogue dated 1823–1833 'Birds in WB junrs Collection'[8] indicates 'when and where got' and lists some 347 specimens, many of them shot in the environs of Darlington and on the Durham coast by William himself. Other members of the Backhouse family sent specimens to the young ornithologist, mainly from the North of England (James and Thomas Backhouse, the York nurserymen, sent him examples of ducks from York for instance), but also items collected during business trips; there are also a number of specimens obtained in Leadenhall Market. William kept an account of the cases made to house his stuffed birds,[9] and lists their contents, manufacturer and date made. He continued to develop as an artist, producing watercolours (Fig. 3), steel engravings and pencil drawings of a variety of subjects, but especially birds.[10] Of particular interest are two large sets of pencil drawings of British birds which are annotated with colour notes, measurements, and details of habitat (Fig. 4). It may be that William Backhouse planned to produce an illustrated account of the British avifauna, as in one manuscript he allocates space to each species according to size of bird, and indicating the reductions which would be necessary, dividing all species into two separate categories of 'Land Birds' and 'Water Birds'.[11] The majority of the line drawings of birds date from 1835–1839; it is interesting to speculate on the impact that the ornithological works of Thomas

FIGURE 2
A watercolour by William Backhouse of a larva of the Grey Dagger *Acronicta psi* (top) and larva and adult of the Vapourer *Orgyia antiqua*

Bewick, John Gould and Prideaux John Selby, perhaps available to a wealthy family, may have had on the young, energetic Backhouse.

When William returned to the Darlington Bank, he took up residence at Shull House (Fig. 5), adjacent to the family estates which had been purchased early in the nineteenth century. Following a transfer of property in 1847, William moved to the house known as St. John's (Fig. 6) which lies in a remote situation on the edge of Pikeston Fell, overlooking the town of Wolsingham. It was here that he began his major horticultural work, the development of new varieties of bulbs, especially narcissi and lilies. Coats (1968) suggests that Backhouse may have been inspired by William Herbert's *Amaryllidaceae* (1837): however it seems that he did not begin hybridizing in earnest until 1856. Being a busy man, he carried out his experiments before leaving for work; his plants were kept in a small glass porch adjacent to his study.

FIGURE 3
Watercolour of green woodpecker by William Backhouse

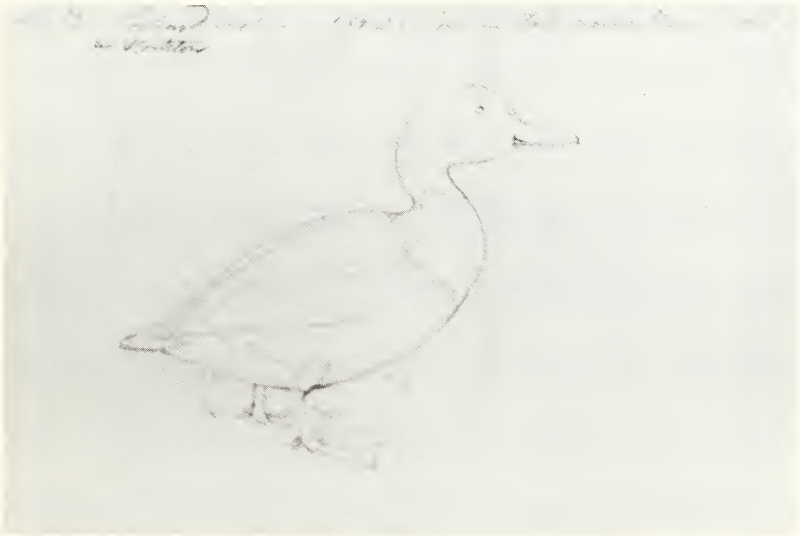

FIGURE 4
An outline drawing of a pochard, with detailed measurements, made by William Backhouse in 1834

FIGURE 5
Shull House in 1835. A pen and ink drawing by William Backhouse

FIGURE 6
St. John's Hall, Wolsingham, 1987

In the development of small crowned narcissi, Backhouse aimed mainly for colour, using *Narcissus poeticus poetarum*, *majalis angustifolius*, and what he described as 'an early variety', possibly *N. poeticus ornatus*, to produce many splendidly coloured forms. Backhouse also worked on the development of trumpet daffodils; 'Emperor' and 'Empress',[12] raised from crosses between *Narcissus pseudo-narcissus* and *Narcissus bicolor*, were particularly successful varieties, so much so that they are still (1987) available as cultivars. 'Weardale Perfection', another trumpet daffodil, came from a later generation of hybrids, and was selected from a batch of *bicolor* trumpet seedlings. According to Bowles (1934), William Backhouse developed the original form of the Barri daffodils, including the varieties 'Crown Prince' and 'Crown Princess'. Backhouse kept meticulous records of the origin and performance of his various crosses, and of the planting schemes used in the garden at St. John's.[13] Backhouse summarized much of his experience with the hybridization of *Narcissus* in a letter published in *The Gardener's Chronicle* (Backhouse, 1865).

Backhouse died in Leeds in 1869; before his death his plants were acquired by Peter Barr (1826–1909) the so-called 'Daffodil King', seedsman and florist of Covent Garden (Hadfield 1960) and found to contain no less than 192 distinct varieties. Barr had also obtained the narcissi of Edward Leeds (1802–1877), gardener and nurseryman of Pendleton, near Manchester, which held 169 varieties; he used these two great collections to develop, with John Gilbert Baker (1834–1920) of Kew, an artificial but convenient classification system for narcissi. Leeds, Barr, Backhouse and F. W. Burbidge of Dublin can be regarded as the four pioneers of the early development of the daffodil in Britain, and the system adopted used their names for its subdivisions; thus the terms 'Leedsii', 'Barri', 'Backhousei' and 'Burbidgei' came into common usage.[14] In 1884, the year of the first 'Daffodil Conference', Peter Barr published *Ye Narcissus or Daffodyl Flowre and Hys Roots, with Hys History and Culture*, embodying besides all the old species and varieties of daffodils, a complete list of the new Leeds and Backhouse seedlings.

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My thanks are due to Brent Elliott, Librarian of the Royal Horticultural Society for patiently responding to many queries and to Sue Hubbard, Archivist for Hereford and Worcester County Council, for making the Backhouse archive available to me. James Page of Sutton Court, Hereford, welcomed my research into the achievements of his family, and allowed access to family papers and correspondence as well as providing stimulating discussion and useful information. The Small Research Grants Committee of the University of Newcastle provided funds for this work.

Notes

1. Queries and Advices, 1791, quoted in *Journal of the Friends Historical Society* **49**: 221 (1961).
2. Raistrick (1968), for example, refers to Thomas Lawson (1630–1691), Peter Collinson (1693–1768), Phillip Miller (1692–1771), John Bartram (1699–1777), James Logan (1674–1751), John Fothergill (1712–1780), William Curtis (1746–1799), William Woodville (1752–1805), John Dalton (1766–1844) and Lewis Weston Dillwyn (1778–1855).
3. Winch Correspondence, Linnean Society.
4. In the Hooker Correspondence at Kew, there is a letter from James Backhouse 1 of York to William Hooker, 18 June 1844, '. . . he rose from his seat . . . to all appearance with the intention of addressing the congregation, paused a moment and fell dead without the least struggle.' In one respect this event was fortuitous, as William had been due to set sail to Norway on a preaching mission with Edward Backhouse junior of Sunderland. The vessel on which they had booked their passage foundered in a storm with the loss of all hands. James Backhouse wrote to Hooker of this event on 25 June 'How great are the uncertainties of life! . . . Thus by the

sudden and unexpected death of Wm. B. the life of his nephew seems to have been prolonged to his friends'.

5. Reference is made to the loss of William Backhouse's herbarium in *The Naturalist* (1: 41–42), '. . . we have to deplore the loss of several valuable herbaria . . . two good collections of plants, on loan, for the completion of the work [Baker and Tate's *The Flora of Northumberland and Durham*] . . . belonging to the late Mr. William Backhouse of Darlington, and the late Mr. Storey of Newcastle.'
6. William Backhouse's certificate which records that he was a founder member of the Society is in the Hancock Museum Archives.
7. Private Collection, James Page, Sutton Court, Hereford.
8. Hereford and Worcester Records Office (G 89/104).
9. Hereford and Worcester Records Office (G 89/103).
10. Hereford and Worcester Records Office (G 89/102) and Private collection, James Page, Sutton Court, Hereford. The pencil drawings date from 1832–1839; water-colours (for example, Green Woodpecker and Turnstone), and engravings (of Little Grebe and Skua) are individually dated within this same period.
11. Loose sheet within G 89/103, Hereford and Worcester Records Office.
12. Nicholson (1884–1887) describes 'Emperor' as 'Perianth deep primrose, trumpet rich full yellow. Very large flower' and 'Empress' as 'Perianth white, and of great substance, trumpet rich yellow. A very large flower'. Burbidge (1875) figures both varieties (Plate IX); they are also figured by James Andrews in *The Floral Magazine* (Vol 8, 1869); there is also a plate in *The Garden*, September 15, 1883, and a further engraving by Kohl in *The Garden*, December 3, 1892. Burbidge (1875) also figures 'Stella', a star-shaped, narrow form of *incomparabilis* also raised by William Backhouse (Plate XIX).
13. Hereford and Worcester Records Office (G 89/105; G 89/106; G 89/107; G 89/108; G 89/109–115).
14. J. G. Baker first reviewed the genus *Narcissus* in *The Gardener's Chronicle* in 1869; a modified version of this is included in Burbidge (1875). Baker's grouping of the species, varieties and hybrids of *Narcissus* was amplified in *The Gardener's Chronicle* for 1884. The list is divided into Series 1, Genuine Species and their varieties, and Series 2, Hybrids, known or presumed, both series having subdivisions based on corona length. Barri (*N. poeticus* × *N. pseudo-narcissus*), Leedsii (*N. montanus* × *N. pseudo-narcissus*) and Backhousei (parents not established), are included in Series 2, Mediocoronati. (Corona equal to or greater than the division of the perianth.) Nicholson (1884–1887) lists 'Backhousei' 'William Wilks' and 'Wolley Dod' as garden varieties of Backhousei, defined as having a coffee-cup shaped corona. Other Backhouse names listed here are 'C. J. Backhouse' ('the most remarkable and attractive of the yellow form of *Incomparabilis*'), and the Nelsoni's 'Mrs C. J. Backhouse' ('perianth pure white, and broad, cup yellow and very long'), and 'William Backhouse' (perianth white, cup yellow).

    Baker's artificial classification was replaced by that of the Royal Horticultural Society, which assigned narcissi to 11 divisions to accommodate all species and hybrids — Trumpets, Incomparabilis, Barri, Leedsii, Triandrus hybrids, Cyclameneus hybrids, Jonquilla hybrids, Tazetta, Poeticus, Doubles and Various. From 1st January 1950 this classification was further modified, and the terms Leedsii, Barri and *Incomparabilis* dropped. The present system has the following subdivisions: 1. Trumpet 2. Large-cupped 3. Small-cupped 4. Double 5. Triandrus narcissi 6. Cyclamineus narcissi 7. Jonquilla 8. Tazetta 9. Poeticus 10. Species, wild forms and hybrids and 11. Miscellaneous.

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BOOK REVIEWS

The Darkness is Light Enough: The Field Journals of a Night Naturalist by **Chris Ferris.** Pp. 374, with line drawings. Michael Joseph. 1986. £12.95.

In recent years a number of naturalists' notebooks and diaries have been published but the present book by Chris Ferris is different in that most of the action takes place at night — not just dusk but the dead of night from midnight to dawn!

Chris Ferris begins her studies when most other naturalists are retiring to bed. Night after night throughout the year and in all weathers she has carefully recorded the habits of nocturnal animals near her home. The observations of tawny owls, foxes and badgers which make up the bulk of the book are all the more valuable because most have been made away from the nest, earth or sett. She has trailed foxes and badgers for miles across fields and through woodlands, and was accepted by at least one group of badgers to the extent that they actually musked her!

I do have a few small criticisms. The diary format invariably leads to some repetition and also means that observations on a particular subject are widely scattered throughout the book. This latter point is partially offset by an excellent index, but I do feel that a final chapter or two summarizing Mrs. Ferris's major observations would have been useful. Furthermore, whilst the black and white drawings which illustrate the beginning of each chapter are attractive, the rather fuzzy, grey pictures which occur in the text are not, and could well have been omitted.

However, these are minor criticisms of an otherwise excellent book based on first-class field work. Chris Ferris is to be congratulated on pushing back the frontiers of nocturnal animal watching.

JKS

Wildlife and Wilderness: An Artist's World by **Keith Shackleton**. Pp. 120, including 49 full colour plates. Clive Holloway Books, London. 1986. £15.00.

The dramatic seascapes and landscapes of the polar regions which Keith Shackleton visited during fifteen years as artist/naturalist on the ship *Lindblad Explorer* are vividly represented in this beautiful book. Browse through the pages and feel the intense cold, experience the rough seas, and observe the patterns of light in an environment few have the fortune to experience. I would defy anyone to look at 'Windy Afternoon in the Weddell Sea' without taking a sharp intake of breath or study 'Off Soundings' without feeling a little uneasy. The drama continues as Shackleton introduces us to the birds and mammals of the Arctic and Antarctic. In many of the paintings wildlife plays a minor role — an albatross distantly skims the waves, a penguin toddles across a glacier — but even here Shackleton's powers of observation and naturalist's knowledge are evident. The powerful, dramatic feel of the majority of the book is lightened by the occasional closer look at the fauna — the discord and argument in 'Gentoo Penguins' or the disdainful stare of 'Five Weddell Seals' for example.

Shackleton writes as well as he paints, and his descriptions of each of the plates, as well as his introductory 'Some thoughts on painting' provide entertaining and often amusing background reading, as well as giving us a rare glimpse of the philosophy of one of our most distinguished wildlife artists. It is his view that of all the ingredients that go to make painters, 'the only one that matters is sincerity with oneself and this simply means painting, or trying to paint, from the heart, and doing one's own thing'.

The paintings, 48 in all, have been splendidly reproduced and the publishers are to be congratulated for their efforts to bring them together in a book which is extremely reasonably priced; an essential read for anyone with a love of wilderness.

PSD

Jim Corbett's India, selected by **R. E. Hawkins**. Pp. 250. Oxford University Press. 1986. £4.95.

Despite the huge loss of natural habitat, India is still a Mecca for naturalists. Yet many of today's visitors must long for a taste of the old India, the India of the British Raj, of an era, which like most of the jungle, has gone forever. This is Jim Corbett's India. This inexpensive paperback volume includes exciting extracts from such classics as 'Man-eaters of Kumaon', 'Jungle Lore' and 'The Man-eating Leopard of Rudraprayag'.

The publishers are to be congratulated for making these long out-of-print stories available to a new generation of naturalists.

Corbett was one of the breed of great British hunter-naturalists who became a legend. It must reflect well on the man that one of the most important national parks in a long independent India still proudly bears his name.

JKS

No Ordinary Gardener: Thomas Knowlton 1691–1781 by **Blanche Henrey**; edited by **A. O. Chater**. Pp.324, numerous illustrations. British Museum (Natural History), London. 1986. £17.50.

Those interested in the history of botany, landscape gardening and horticulture have cause to be grateful to Blanche Henrey for assembling such a body of information, to A. O. Chater for editing the material after the author's much lamented death, and to the British Museum for the high quality of production. The volume will be of particular interest to Yorkshire readers, since it not only provides a detailed study of the famous garden at Londesborough but also contains much information on many Yorkshire worthies such as Richard Richardson and Samuel Brewer. In addition, there are numerous references to the Yorkshire flora of the 18th century.

Blanche Henrey's detailed researches have brought to life a hitherto somewhat shadowy figure.

VAH

ANT SPECIES IN YORKSHIRE

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City Museum, Leeds
and J. HUGHES
19 Grange Close, Wrexham

Yorkshire, despite its varied topography and geology, has a limited number of indigenous ant species, only 17 species having been recorded in their natural habitat compared with a total of 42 from the British Isles as a whole. This paucity of ant species in Britain north of an approximate line from the Wash to the Mersey is at least partly attributable to the low summer sunshine and temperature. In this area mean hours of bright sunshine rise above six only during May and June on the coast, and the mean temperature for July, the hottest month of the year, seldom reaches 15°C. However there are some interesting features with regard to recent fossil records.

Indigenous species presently known are as follows:

	VC 61	62	63	64	65
Myrmica lobicornis Nylander	●	●	●	●	●
M. rubra (Linnaeus)	●	●	●	●	●
M. ruginodis Nylander	●	●	●	●	●
M. sabuleti Meinert	●	●	●	●	●
M. scabrinodis Nylander	●	●	●	●	●
M. sulcinodis Nylander	●	●	●	●	●
Leptothorax acervorum (Fabricius)	●	●	●	●	●
Formicoxenus nitidulus Nylander		●	●		
Formica fusca Linnaeus	●	●	●	●	●
F. lemani Bondroit	●	●	●	●	●
F. lugubris Zetterstedt	●	●	●	●	●
F. rufa Linnaeus	○			●	
Lasius flavus (Fabricius)	●	●	●	●	●
L. mixtus (Nylander)	●	○			
L. fuliginosus (Latrielle)				○	
L. niger (Linnaeus)	●	●	●	●	●
L. umbratus (Nylander)		○		○	

Additional fossil records of indigenous species:

Stenamma westwoodii (Westwood)	●				
Leptothorax corticalis (Schenck)	●				
Hypoponera punctatissima (Roger)		●			

● 1961 →
○ Pre 1961

Introduced species temporarily or permanently resident:

Pheidole tenerifana Mayr
Tetramorium bicarinatum (Nylander)
Monomorium pharaonis (Linnaeus)
Paratrechina vividula Nylander

In addition to the above, some of which attain pest status in heated premises such as hospitals, bakeries and industrial establishments, a number of species are occasionally introduced from time to time on imported plant material or carried in inadvertently in luggage or vehicles. The most notorious of these is the Argentine Ant *Iridomyrmex humilis* Mayr, which pullulates along the Mediterranean coast and has been reported

from a kitchen in East Yorkshire. Apart from *Monomorium pharaonis* which has long been established in our major cities and is very difficult to dislodge, most imported ants do not survive long at any one site and being denizens of warm temperate zones cannot establish themselves outdoors in our climate. Carpenter ants, *Camponotus pennsylvanicus* Mayr and *C. herculeanus* (Linnaeus) respectively are occasionally reported from docks and timber yards imported in timber from North America or Europe; although they might reasonably be expected to establish themselves, for example in forestry plantations, they have never been known to do so.

Indigenous Species

The genus *Myrmica* is represented in Britain by 9 species, of which 6 occur in Yorkshire. *M. lobicornis*, recognizable by its dark gaster and the toothlike process on its angled scape, occurs in single colonies on stony pasture, heath and dry open woodland. It is somewhat local but may best be found on south facing rocky slopes. *M. rubra* is widespread and common except on the higher exposed moors. It is abundant on the lower slopes and in river valleys in the Dales. Nests usually contain many queens. This species has the most vicious sting of all the British ants, being comparable with that from a stinging nettle. It is distinguished from the more widespread and commoner *M. ruginodis* by the shorter, more broadly based spines, smaller petiole and weaker sculpture. *M. ruginodis* is probably the most widespread of all British ants and may be found equally abundantly on high and low ground; it is often the only species found on the high moors.

M. scabrinodis and *M. sabuleti* have rather similar habits, but the former with its smaller scape process is much more generally distributed. *M. sabuleti* is quite local in Yorkshire, although often quite numerous where it does occur. It is mainly found in warm places such as sheltered sunny banks. *M. sulcinodis* is perhaps the more interesting species in this group; it is a characteristic ant of drier moorland over millstone grit such as the heather moors around Pateley Bridge (SE 16) and Haworth (SE 03) but is also common on the North York moors. It is a dark red, deeply sculptured species and unlike the other *Myrmica* species is not to be found on the plains in agricultural areas.

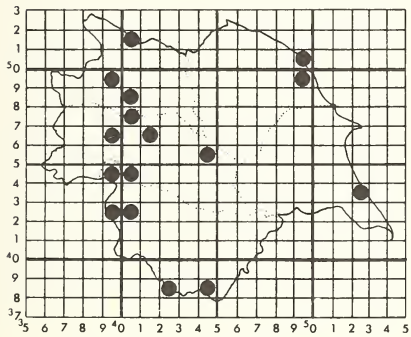
Leptothorax acervorum is a small species generally associated with woodland, living in tree stumps. In Yorkshire, however, it is frequent on high open moorland, nesting under dry peat between tussocks of heather. *Formicoxenus nitidulus* is an interesting species, since it is only to be found living as an inquiline in nests of the large wood ants of the *Formica rufa* species group. It is a minute, shining ant, relatively seldom observed because of its size and cryptic habits but it occurs with wood ants in the Scarborough area, to the north of Helmsley (SE 68) and in the Hebden Bridge (SD 92) woodland complex.

Formica fusca, the large black ant, is a southern species in the British Isles and is very local in Yorkshire, where it is known from a few lowland localities including Strensall Common (SE 66), Meanwood Park, Leeds (SE 23) and southwest of Doncaster (SE 50). It is replaced in North Britain and on high ground by the very similar *F. lemani*, which differs in the somewhat coarser sculpture and the presence in the worker caste of bristles on the front part of the thorax. This is one of the most abundant ants in Yorkshire but does not occur on the predominantly arable land of the plain of York.

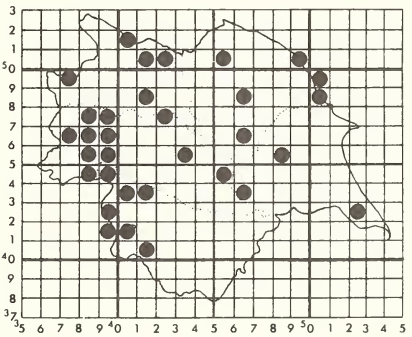
Formica lugubris is the common wood ant of Yorkshire and is locally abundant on some plantation areas of the North Yorkshire moors, where it continues to flourish. This is a large, aggressive ant with a powerful bite, which freely squirts formic acid through its anal gland when disturbed. On a hot day, especially when the ants are in an excited state, the stench of this acid is recognizable at a distance. Like those of all wood ants, its nests are constructed of twigs and leaf litter, such mounds sometimes reaching

heights of a metre or more. This species is the one commonly used on the continent to protect woodland against the ravages of leaf eating insects and it was noticeable a few years ago in the Hebden Bridge area that trees in the proximity of ant nests stood out as islands of green among the caterpillar-damaged woodland. The main food source for wood ants however is aphid honeydew and foraging trails to aphid-laden trees may extend as far as 100 metres. *Formica rufa*, a more southern species is well established in a wooded valley in the Pateley Bridge area (SE 17). It also used to exist in Brockadale Wood, Wentbridge (SE 5017) about 20 years ago but ironically disappeared, shaded out by sycamore trees, at about the time the woodland became a nature reserve. Both species prefer semi open woodland on undulating ground. Over-shading through dense planting, woodland clearance and urban growth have resulted in extinction from about half of the localities from which wood ants were recorded in Yorkshire over 50 years ago.

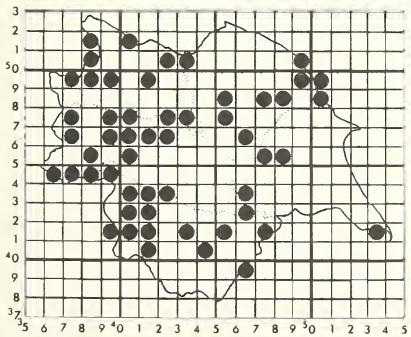
Lasius flavus is the little yellow mound ant characteristic of chalk and limestone pasture and some old undisturbed meadows may be covered in such grassy ant mounds. This species is widely distributed in the lower limestone valleys, often nesting under stones as well as in mound nests; it is less abundant in Yorkshire than in some other areas and



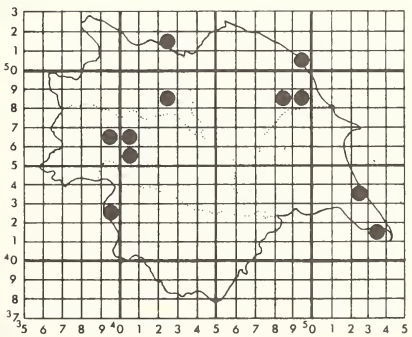
Myrmica lobicornis Nylander



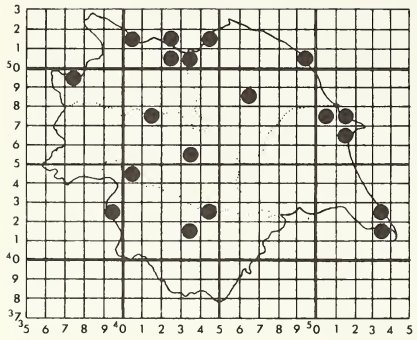
Myrmica rubra (Linnaeus)



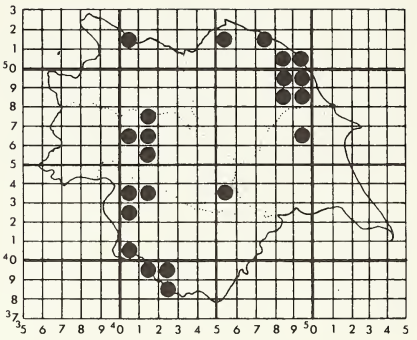
Myrmica ruginodis Nylander



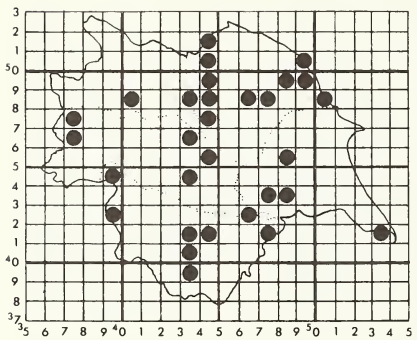
Myrmica sabuleti Meinert



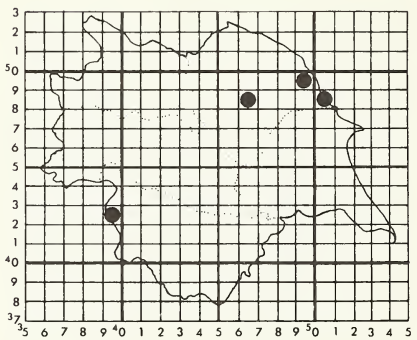
Myrmica scabrinodis Nylander



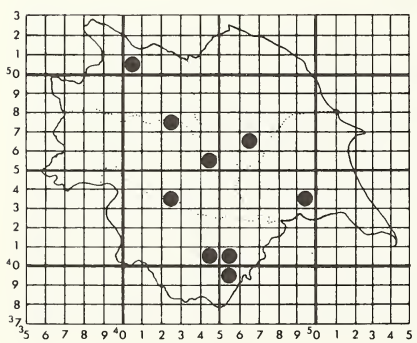
Myrmica sulcinodis Nylander



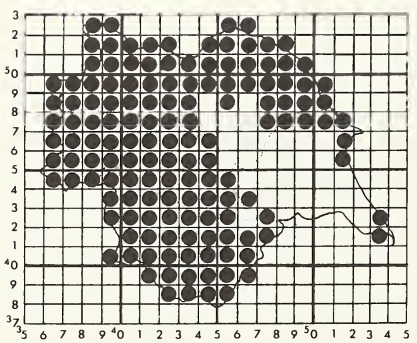
Leptothorax acervorum (Fabricius)



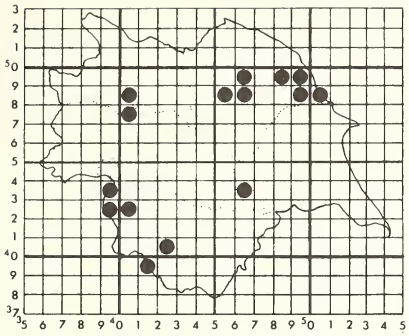
Formicoxenus nitidulus Nylander



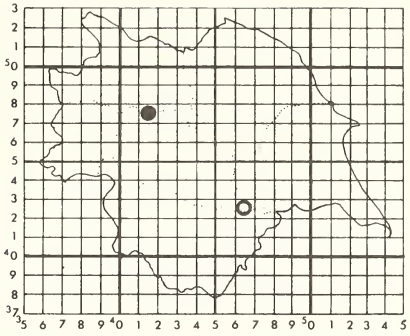
Formica fusca Linnaeus



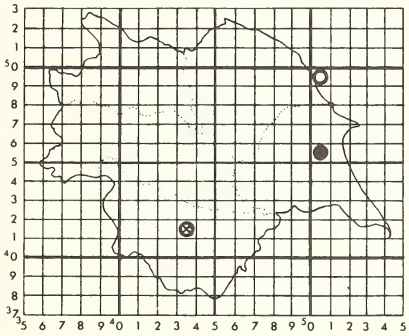
Formica lemani Bondroit



Formica lugubris Zetterstedt

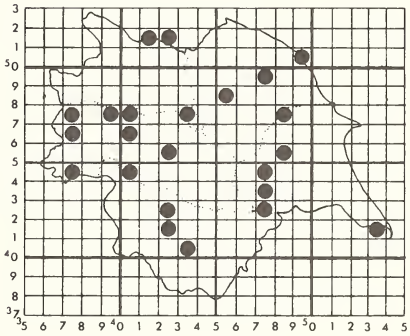


Formica rufa Linnaeus

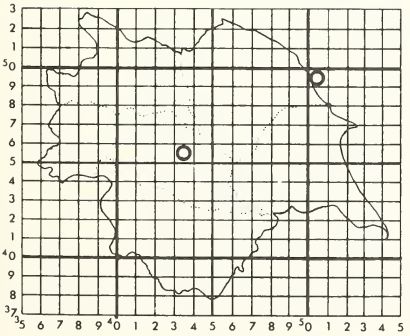


○●*Lasius mixtus* (Nylander)

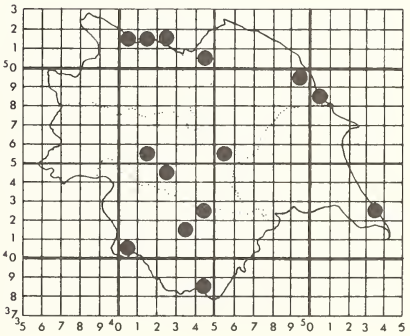
⊗ *Lasius fuliginosus* (Latrielle)



Lasius flavus (Fabricius)



Lasius umbratus (Nylander)



Lasius niger (Linnaeus)

does not occur on acid or high moorland. *L. niger*, a small black ant, is also a valley species in Yorkshire, often nesting in the neighbourhood of streams and rivers. It tends to be abundant in and around towns and villages and is sometimes a nuisance, raiding kitchens for sugary substances. In August, large unmated winged queens and the much smaller winged males leave the nests for their mating flight and large numbers of such insects emerging from the footings of houses, although quite harmless, may give cause for alarm.

Lasius fuliginosus has only been recorded in Yorkshire from Wooley Edge (SE 31) many years ago; there are no recent records of this highly aromatic, shining black ant although it is known from several places on or near the Lancashire coast, where it nests in hedges, the base of old trees and in sandy woodland. *L. mixtus* and *L. umbratus* are evidently rare in Yorkshire with very few records. These are yellow ants similar to *L. flavus* but larger. Foundress queens have to secure adoption in nests of *L. niger*, whose queen they kill, since they are unable to rear brood unaided. Both species live underground in grassy areas or open woodland at the roots of trees or under deep stones and the lack of Yorkshire records is no doubt partly due to their cryptic way of life.

Fossil Records

Additional species are known from recent fossil records. Head capsules of the cosmopolitan species *Hypoponera punctatissima* were found among other insect remains in York from old sediment dating from Roman times c.150 AD (Buckland 1972). This ant occurs in many places in Britain, in hot houses and fermenting heaps where temperatures of 25°C or more necessary for brood rearing may develop and although its natural habitat is in warm temperate regions, it has evidently long been a denizen of the British Isles. There is, in fact, an old record from a tropical house in the City of York (Donisthorpe 1926) and there may well be more recent occurrences.

FIGURE 1
Fossil *Stenamma westwoodii* (Westwood) — Head capsule

Stenamma westwoodii (Fig. 1) has been recognized from head capsules from the Bronze Age period found at Thorne Moor (SE 61). This is about 100 miles north of the nearest known record for this relatively southern species. Other species determined from the same sample of insect remains (from a project study by A. R. Davies under the guidance of Professor A. D. Lee, University of Leeds) included *Myrmica ruginodis*, *M. scabrinodis*, *Formica fusca* and *Leptothorax acervorum*. An unidentified head capsule (Fig. 2) closely

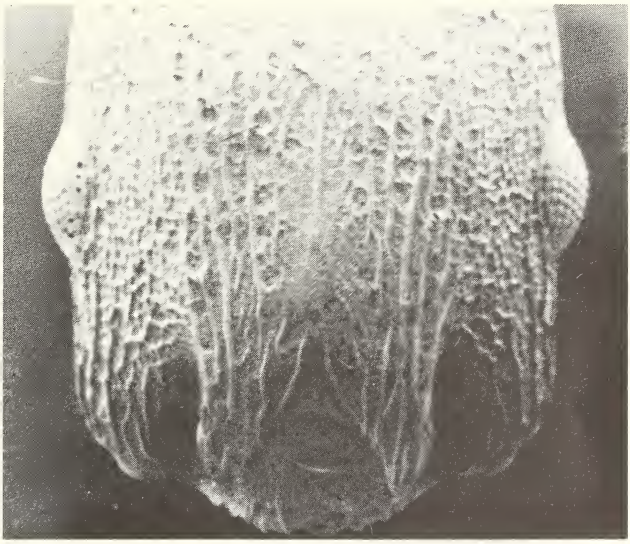


FIGURE 2
Fossil *Leptothorax* cf *corticalis* — Head capsule

resembles *Leptothorax corticalis* Mayr. This is a central European species found rather locally in oak trees, with a relict population in Central Sweden but not known to occur in the British Isles.

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BOOK REVIEWS

Multivariate Analysis of Ecological Communities by **P. G. N. Digby** and **R. A. Kempton**. Pp. viii + 206, including numerous tables and line drawings. Population and Community Biology Series. Chapman and Hall, 1987. £25 hardback, £12.95 paperback.

The study of ecological communities frequently involves the collection of large amounts of data, the satisfactory analysis of which requires the use of a powerful computer to

cope with the very large number of calculations involved. The increasing availability of computing facilities has brought the opportunity to perform quite complex analyses within the reach of most ecologists provided that suitable techniques of analysis are available. Because ecological data typically have many variables, such as several species recorded in a number of sites, the methods that deal with such data matrices are called multivariate analyses. This book brings together many of the available multivariate techniques.

The book gives an overview of many useful and interesting approaches to multivariate analysis, some of which have not been included previously in general books on such methods. After discussing the properties of ecological data and some simple coefficients, subsequent chapters are devoted to preliminary displays of the data, ordering methods, methods of comparing different orderings, methods of classification, the analysis of asymmetry, and computing options available in which the GENSTAT package is particularly promoted. There is also an appendix on matrix algebra to assist readers unfamiliar with the notation used in the chapters on ordering methods, which form the largest section of the book.

This is a good book, illustrating the range of possible methods of display and analysis available, including many useful examples of analysis of ecological data sets, and can be strongly recommended as a reference text. A reader previously unfamiliar with multivariate analysis, however, might be advised to consult a more general text on quantitative ecology, such as Kershaw, K. A. and Looney, J. H. H. (1985) *Quantitative and Dynamic Plant Ecology*, Edward Arnold, before embarking on the present volume.

WHGH

Flora of the Isle of Man by **D. E. Allen**. Pp. xiv + 250, plus frontispiece map and 6 figures. The Manx Museum, Douglas, Isle of Man. '1984' [1986]. £13.75.

A very welcome addition to published county floras, for which the British are renowned. David Allen meets all the criteria of good floras in providing not only a detailed systematic list containing a wealth of data on the ecology and status of each species, but also highly readable and informative introductory matter, especially the chapter on 'The discoverers of the flora' which is particularly illuminating, as one would expect of one of Britain's foremost botanical historians.

The book is attractively produced, but the imprint date is very misleading: '1984' was the target for publication, and although copies were only available for distribution in May 1985, publication was delayed until January 1986 in order to coincide with Manx Heritage Year celebrations. Future bibliographers beware!

MRDS

Handbook of European Sphagna by **R. E. Daniels** and **A. Eddy**. Pp. 262 (including 85 figures and maps), plus 12 pages colour plates. Institute of Terrestrial Ecology. 1985. £10.50 paperback (plus £1.50 postage & packing from: Monks Wood Experimental Station, Abbots Ripton, Huntingdon PE17 2LS).

Sphagna are highly distinctive plants, the different taxa having specific ecological demands; they occur throughout Europe in acidic mires, many of which are greatly under threat. It is therefore especially important to correctly identify which species exist in a particular habitat. To date, identification of this important group has been the province of a small number of specialists. This latest work, through its keys, descriptions and figures, makes it possible not only for the bryologist but also for the ecologist to become much more familiar with the group. Its value in the field however is limited since the key relies heavily upon microscopical characters. An index to species (including synonyms) would have been a welcome addition. Nevertheless, a most valuable addition to bryological literature and scholarship.

MRDS

NOTES ON YORKSHIRE MOLLUSCA — 7
THE GENUS *TESTACELLA* IN YORKSHIRE

A. NORRIS
Leeds City Museums

Introduction

The Testacellas are a group of three species of terrestrial slug of West European distribution, which are distinguished from all other British slugs by the presence of an external shell. They are carnivorous, feeding mainly on earthworms, and have powerful jaws. Unlike other slugs, Testacellas can inflict on humans a bite capable of bringing blood.

The published records of this group within the county indicate that all three species have been recorded at various times. Indeed, all three species are recorded as having been found in the Scarborough district (Walsh & Rimington 1956). The status of two of the three species in Yorkshire has, however, always been open to doubt. A number of new records of *Testacella scutulum* over recent years has made it necessary for us to re-assess all the old records. This note is an attempt at this re-evaluation, with the intention of bringing the status of these records up to a currently acceptable standard.

Notes on the Three Species and their Status in Yorkshire

Testacella (Testacella) maugei Ferussac 1819

This species has never been accepted as a member of the Yorkshire fauna by any of the national recorders, and therefore does not appear in any of the census records. The Yorkshire record of this species is based on a specimen recorded by J. A. Hargreaves from a garden on South Cliff, Scarborough in 1900 (Walsh & Rimington 1956). John W. Taylor in his *Monograph*, part 8, page 20, 1902 (Taylor 1894–1921), published a record of *T. scutulum* based on material forwarded to him by J. A. Hargreaves from a tunnel in Mr Beeforth's garden, on the Esplanade, Scarborough, found on 11 Feb. 1899, specimen in Bradford Museum. This record also occurs in W. D. Roebuck's manuscript records as *Testacella haliotidea* var. *scutulum*. It is highly probable, therefore, that these two records are one and the same, despite the slight discrepancy in the dates. The fact that *T. scutulum* has also been recorded in the general area by several other people, both prior to this date and subsequently, strengthens this opinion.

Testacella (Testacella) haliotidea Draparnaud 1801

Many of the old records of *T. haliotidea* can be transferred to *T. scutulum* as *scutulum* was considered by many authors to be only a variety of *T. haliotidea* and, therefore, they were never separated prior to publication. Taylor, in his *Monograph*, part 8 page 11, 1902, lists four Yorkshire localities for *T. haliotidea*. 'Yorks S.E. — Swailes' Nursery Garden, Beverley : J. D. Butterell, 1883, Yorks S.W. — Sandbeck Park, Rotherham, G. Summers, and Wath-on-Dearne, W. McKeigh Jones (Webb, *J. of Mal.* July 1897, p. 25). — Orchid-house, Ferniehurst, Shipley, March 1892 : E. Self'. Although Taylor himself authenticated specimens from gardens at Beverley collected by J. D. Butterell on 20 May 1883 as *Testacella haliotidea* var. *scutulum* (W. D. Roebuck MSS.), this record was subsequently confirmed in error as *haliotidea* ss. by W. D. Roebuck MSS.) (see note below). The records for south-west Yorkshire (VC63), like the above record for south-east Yorkshire (VC61), have never been accepted by the national recorders for the census. The only records of this species accepted for Yorkshire at the present are the records from 'Scarborough' Dec. 1909 J. A. Hargreaves (verified by J. W. Taylor) and from Holbeck Gardens, South Cliff, Scarborough (VC62), collected by E. A. Wallis in March 1952, identified by A. Smith. The latter record is, however, open to considerable doubt, and I believe it to refer to *T. scutulum* (see notes below). The record from the Orchid-house at Ferniehurst was included in the *Atlas of the Non-*

marine Mollusca of the British Isles (Kerney 1976) as an old record, even though this species has not been accepted for the national census as having been found in vice-county 63. The records from Sandbeck Park, Rotherham and Wath-on-Dearne are both mentioned in Webb (1897), and he indicates in his preamble that specimens were forwarded to him from these localities for confirmation. This species may have been introduced into the River Don drainage at this time, as a result of the expanded interest in market gardens and hot-houses. These three records from VC63 may all be correct, but the evidence would suggest temporary introductions. All Yorkshire records are now considered to belong to *T. scutulum*, with the exception of the above introductions, and J. A. Hargreaves's record for Scarborough.

Testacella (Testacella) scutulum Sowerby 1821
As indicated above, most authors in the past simply considered this species to be a variety of *Testacella haliotidea*, and therefore many of the old records have been attributed incorrectly. This is by far the most common of the three species of *Testacella* in Britain, and is accepted for the national census from vice-counties 61, 62, 63, and 64.

Annotated List of Yorkshire Records

Testacella (Testacella) haliotidea Draparnaud 1801

VC62 Scarborough (Introduced?), Dec. 1909 J. A. Hargreaves, verified by J. W. Taylor Oct. 1922.

VC63 Shipley, Orchid-house, Ferniehurst, (44/13) 1890 E. Self. (Introduced). This record is included in the Atlas, but not accepted for the national census.

Rotherham, Sandbeck Park, (43/5690) 1897 G. Summers. (Introduced ?). Accepted by W. D. Roebuck for the Ms. record, as *T. haliotidea* but not accepted or included in the census. Specimens probably seen by Webb and confirmed as *T. haliotidea* ss.

Wath-upon-Dearne (44/40) 1897 W. McKeigh Jones. (Introduced ?). Accepted by W. D. Roebuck for the Ms. record, as *T. haliotidea*, but not accepted or included in the census. Specimen probably seen by Webb and confirmed as *T. haliotidea* ss.

Testacella (Testacella) scutulum Sowerby 1821

VC61 Beverley, Swailes Nursery Garden, (54/03) J. D. Butterell, 1883. (Introduced). The status of this record is dubious, but the evidence suggests that this record should refer to this species. Recorded in Petch 1904, and in Taylor's Monograph as *T. haliotidea.* In the Ms. note-books of W. D. Roebuck this record is entered as var. *scutulum*, authenticated by Taylor himself and based on specimens submitted by J. D. Butterell from this locality collected on 20 May 1883. In subsequent note-books now in the British Museum (Nat. Hist.) Roebuck enters this record as both *T. haliotidea* ss. and *T. scutulum.* This discrepancy suggests an error in the transcription of records from one set of note-books to another.

Hessle, Woodleigh, (54/02) 1897 F. Masson. (Taylor 1902; Petch 1904 as *T. haliotidea*) + *JDB Nat* 8: 185 + *J. Conch.* July 1897 4: 67.

VC62 Castle Howard, Gardens (44/7170) in large numbers, J. Riddell. (Taylor 1902; Webb 1897).

Scarborough, (54/08) Walshaw and Son's Nurseries. (Taylor 1902; Webb 1897; Walsh 1956).

Scarborough, (54/08) Tunnel in Beeforth's Garden, Esplanade, 11 Feb. 1899 J. E. Hargreaves. (Taylor 1802); (Bradford Museum Coll.).

Scarborough, Holbeck Gardens, South Cliff (54/0487). E. A. Wallis March 1952, recorded as *haliotidea,* det A. Smith. I have always considered this identification to have been made in error. *T. scutulum* is particularly common in the Scarborough district, and yet this species appears not to have been recorded by E. A. Wallis. It is highly probable that this record refers to *scutulum*.

Scarborough, (54/04288l) Valley Gardens 1971, 1975, 1983 I. Massey, (A. Norris Coll.).

York. Rev. Smith's Garden. (44/65), A. Smith 23 March 1921 (A. Smith Coll. Leicester Museum).

York, Museum Gardens, (44/5952) A. Smith 1952. (A. Smith Coll. Leicester Museum).

VC63 Horbury (44/2918) 2 April 1891 W. Rushforth. (Taylor 1902).

Bradford, Frizinghall, Garden Thornfield, (44/1436) 1899 J. Beanland. Recorded in Booth 1921, as *T. haliotidea*. (Bradford Museum Coll.).

Rastrick (44/12) 1906 A. C. Lane.

Brighouse, (44/12) Kershaw's Nursery, common Nov. 1909 F. Taylor. 5 March 1912, J. H. Lumb.

Apperley Bridge, near, Crawling on road (44/1937) 1909 A. Hartley. (Booth 1921).

Brighouse, Toller Lane, Bradford Road, (44/12) abundant, 5 March 1912 S. H. Lumb. Recorded in Booth 1921, as *T. haliotidea*.

Bingley, Gardens, Milner Field, (44/13) Numerous 1914 J. Moorby. (Booth 1921) (Bradford Museum Coll.).

Bradford, Garden, Park Drive, Manningham, (44/1534) 1920 F. Rhodes. Recorded in Booth 1921, as *T. haliotidea*.

Dewsbury, in garden Thornhill end of town (44/2321) 1977. E. Thompson. (A. Norris Collection).

Sheffield, 16 Birch Farm Avenue (43/351817), Oct. 1983 B. Yates. (Sheffield Museum Coll., det. A. Norris) (Riley *et al.* 1983).

Aston, near Rotherham (43/4585), 1985 D. Whiteley. (Rotherham Museum Coll., det. A. Norris).

VC64 Boston Spa, Padman's Nurseries (44/44) July 1877 J. Emmet. (Taylor 1902).

Leeds, North Lane, Headingley, (44/2736) Oliver Marsden's Garden, 1886 Edgar R. Waite. (Taylor 1902).

Leeds, Adel, (44/2739) J. E. Eddison's garden, 26 Nov. 1896 H. Crowther. W. D. Roebuck's MS. notes record this as var. *albida* (Taylor 1902).

Skipton, Gardens, Gladston Hall, (34/95) 1897 C. T. Cribb/J. Hopkinson. (Taylor 1902; Webb 1897; Booth 1921).

Leeds, Hyde Park Road, (44/2736) common, 1 Nov. 1900 O. Manden. (Taylor 1902).

Skipton, Garden, Ashgarth, (34/95) 1910. C. T. Cribb. (Booth 1921).

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BOOK REVIEWS

Ecology and Evolution of Darwin's Finches by **Peter R. Grant.** Pp. xiv + 458, with 101 figures, 63 plates and 24 tables. Princeton University Press. 1986. £36.70 hardback, £15.10 paperback.

This is an attractively produced book about the fourteen species of finch of the Pacific Ocean Islands off South America. Only specialists in bird behaviour and ecology might be able to appreciate the text in its entirety with its enormous amount of detailed information and discussion.

The book is a distillation of the literature and of much original work by the author and his collaborators. It contains excellent photographs, some in colour, of the birds and their habitats and many clear line drawings. The short chapter on comparative growth patterns is particularly illuminating and shows how the different bodily proportions of adult taxa arise during development.

Professor Grant's research illustrates repeatedly the scientific truism that the more we know the more questions arise. It will be the standard work on Darwin's finches for the foreseeable future, a starting point formany field researchers, and a source of material for evolutionists *per se*.

The sixteenth chapter 'Recapitulation and Generalization' will be of particular value to the general reader, and to students who will appreciate the expansion of the evolutionary theme to encompass suggested parallels such as the adaptive radiations of cichlid fishes of the African great lakes.

DJH

The Evolution of Life, edited by Linda Gamlin and Gail Vines. Pp. 256, with numerous full-colour photographs and diagrams. Collins. 1986. £14.95.

This is a reference book for anyone interested in the living world. It investigates how life began on the Earth, explains the workings of genetics and evolution, and examines the controversies that surround these ideas. Dealing with each group of plants and animals in turn, it catalogues the diverse life-forms to be found on Earth today, shows how they evolved, and describes many of their extinct relatives. It explains how life works at the most fundamental level, and looks at the microscopic structure of the cell. In the second part the book considers the challenges that face all living things — getting food and water, moving about, fighting off enemies and reproducing — and compares the many different ways in which these problems are solved. The book is illustrated by 300 full-colour photographs and over 120 diagrams. This is an up-to-date popular book covering the biological sciences.

MEA

ENTOMOLOGICAL REPORTS FOR 1979–1986
HYMENOPTERA: SYMPHYTA

H. E. FLINT and J. H. FLINT

The sawflies have never been a popular group with entomologists and the advent in this report of two new workers on them is very welcome. Their contributions have made significant additions to our records, as, of course, has the diligent labour of Mr Ely. It seems likely that with this increased cover we shall find that insects now considered to be rare will prove to be quite widely scattered across the county. In this report we have our first record of the solomon seal sawfly *Phymatocera aterrima* in the eastern half of the county (it is not yet recorded from VC61) although it has been well known for over thirty years in the western half where its grey-green larvae can strip all the leaves off its host plant leaving only the main stem and the leaf mid-rib. Reports would be welcome when these characteristic larvae are seen.

Twelve sawflies are reported here for the first time in Yorkshire and two of these, *Stethomostus funereus* and *Nematinus williglkiae*, are outstanding in that they are of only very sparsely scattered distribution in England and here are far to the north of other recorded localities.

Two thirds of the British sawflies, i.e. 333 of the 478 listed in the 1978 Kloet and Hincks check list, have now been recorded in Yorkshire. 65 have been based on a single record, often a single example, and attempts in subsequent years to find others have often failed completely. The single example of *Sciapteryx consobrina* reported below must be a representative of a colony on the *Adoxa* in Kirkdale but it requires a warm, sunny period to bring the sawflies out early in the year and the entomologist has to be there at the right time if they are to be found. There must be other colonies of *Adoxa* in Yorkshire that support *consobrina* and if the adults cannot be found perhaps we should search for larvae and attempt to rear them.

Except for the greatly neglected north-west, records cover most of the regions of the county, the number from each vice-county being VC61 171, VC62 213, VC63 187, VC64 259, VC65 69. 46 are known from all five vice-counties. We are grateful to those who have contributed records and whose initials, with those of the writers, are given in the list of species below, J. C. Coldwell, W. A. Ely and G. J. King, and to those who have passed to us specimens for identification. The usual symbols denote county (†) and vice-county (*) additions.

†*Cephalcia lariciphila* Wachtl (63) Ramsden Clough, Holmebridge, 13/6/81; J.H.F. First reported in Britain in 1954 it is likely that this is spreading through the extensive larch plantations.

†*Pamphilius gyllenhali* Dahl. (63) Roche Abbey, 29/6/80; S. J. Mayhow (det. W.A.E.). Widespread but only very occasional single specimens are reported to turn up across the country.

P. inanitus Vill. (*63) Clough Wood (44/2306) and Hugset Wood (44/3007), 6/86; J.D.C.

Xiphydria camelus L. (62) Keld Head, Pickering (44/7484); 27/6/76; G.J.K.

X. prolongata Geoff. (*62) Cornelian Bay, Scarborough, 3/8/80; H.E.F. The most northerly British record of this generally rare wood-wasp. The steady slipping into the sea of the clay cliffs ensures a constant succession of dying trees into which the larvae tunnel. In 1975 *X. camelus* was found here and the presence of these two is an indication of the potential interest of the cliffs of the bay.

†*Calameuta filiformis* Evers. (63) Fleets (44/3407), 6/86; Carlton Marsh (44/3710), 7/86; J.D.C.

Arge clavicornis F. (63) Hoyland Bank (44/2710), 6/86; J.D.C.

A. nigripes Retz. (62) Keld Head, 12/6/83; G.J.K. (*63) Hugset Wood, 6/86; J.D.C.

Zaraea fasciata L. (64) Askham Bog, one female, 3/7/80; Mrs. J. Payne (det. H.E.F.). Only the third report in the county of this conspicuous sawfly.
Strongylogaster macula Klug (*63) Ogden Clough, 9/7/83; J.H.F.
Brachythops flavens Klug (*65) Middleton-in-Teesdale, 21/6/81; J.H.F.
†*Heterarthrus microcephalus* Klug (63) Treeton, 5/8/82; W.A.E.
†*Athalia scutellariae* Cam. (63) Wilthorpe Marsh (44/3308), 7/86, and Bretton Lakes (44/2712), 8/86; J.D.C.
Empria klugii Steph. (*63) Gunthwaite and Clough Wood, 6/86; J.D.C. The only previous Yorkshire records are from Malham Tarn and Ling Ghyll.
Taxonus agrorum Fall. (*62) Lowna (44/6891), 25/6/83; G.J.K.
Apethymus braccatus Gmel. (*63) Bretton Lakes, 8/86; J.D.C. Only twice before in the county.
†*Stethomostus funereus* Klug (62) Mill Farm, Appleton (44/7487), 25/5/85 and Keld Head, 24/6/79; G.J.K.
Phymatocera aterrimma Klug (*62) Keld Head, 21/5/78 and 5/6/83. G.J.K.
Caliroa annulipes Klug (*63) Listerdale, Rotherham, 2/9/81; W.A.E.
†*Sciapteryx consobrina* Klug (62) Kirkdale, 24/4/83; H.E.F. Searching, unsuccessfully, for early sawflies on *Viola* H.E.F. caught a single example of this sawfly which previously had been reported from single localities in Sussex and Berkshire. The larvae are reported to feed on the leaves of *Adoxa* which itself is of rather local distribution.
S. soror Kon. (*62) Keld Head, 24/4/83; G.J.K.
Tenthredo mandibularis F. (*62) Ashberry, 27/7/80; H.E.F. Thornton Bridge, 27/7/80; J.H.F. Forge Valley, 6/9/86; H.E.F. (*64) Halton Gill, Littondale, 24/7/84; J.H.F. Flying around and running actively on leaves of *Petasites* in hot sunshine on river banks.
Macrophya ribis L. (*65) Bedale, 17/7/82; W.A.E.
M. punctumalbum L. (*61) Rise Wood, near Skirlaugh, 12/6/82; J.H.F.
†*Priophorus ulmi* L. (65) Bedale, 17/7/82; W.A.E.
Pristiphora denudata Kon. (*63) Lindrick, 14/8/82; W.A.E.
†*P. biscalis* Foerst. (64) Askham Bog, 16/5/79; J.H.F. A southern species here far to the north of its usual range.
Nematinus acuminatus Thoms. (62) Bonfield Gill (44/6094), 7/6/80; G.J.K.
†*N. caledonicus* Cam. (62) Keld Head, 5/6/83; G.J.K.
†*N. williglkiae* Stein (63) Hooton Roberts, 3/7/82; W.A.E.
Nematus crassus Fall. (62) Keld Head, 9/6/79; G.J.K. (63) Carlton Marsh, 6/86; J.D.C.
N. umbratus Thoms. (*62) Ashberry, 8/6/80; W.A.E. Scarce, this is only the second Yorkshire record.
†*Pachynematus scutellatus* Hart. (62) Newtondale, 4/5/80; H.E.F.

The following sawflies, of more general and frequent occurrence, are recorded for the first time in the vice-counties indicated below.

VC61: *Eutomostethus ephippium* Panz., Stone Creek; *Hoplocampa pectoralis* Thoms., Stone Creek.
VC62: *Dolerus possilensis* Cam., Bridestones; *Ametastegia pallipes* Spin., Keld Head; *Caliroa cerasi* L., Keld Head.
VC63: *Heterarthrus aceris* Kalt., Gallery Bottoms; *Athalia lugens* Klug, Barnsley; *Monosoma pulverata* Retz., Holmebridge; *Empria alector* Bens., Rockley; *E. tridens* Kon., Chesterfield Canal; *Stethomostus fuliginosus* Schr., Rockley; *Tenthredo ferruginea* Schr., Penistone; *Macrophya duodecimpunctata* L., Holmebridge; *Anoplonyx destructor* Bens., Holmebridge; *Mesoneura opaca* Klug, Barnsley; *Pristiphora laricis* Hart., Holmebridge; *Nematinus luteus* Panz., Brookhouse; *Euura mucronata* Hart., Holmebridge; *Croesus varus* Vill., Holmebridge; *Nematus bergmanni* Dahl., Treeton;

N. lucidus Panz., Wickersley; *N. myosotidus* F., Anston Stones Wood; *Pachynematus clitellatus* Lep., Treeton; *P. apicalis* Hart., Listerdale.

VC64: *Nematus pavidus* Lep., Austwick.

VC65: *Pamphilius sylvaticus* L., Marske; *P.vafer* L., Colsterdale; *Mesoselandria morio* F., Colsterdale; *Birka cinereipes* Klug, Marske; *Dolerus possilensis* Cam., Middleton in Teesdale; *Athalia circularis* Klug, Bedale; *A. lugens* Klug, Bedale; *Eutomostethus luteiventris* Klug, Middleton in Teesdale; *Monophadnus pallescens* Gmel., Colsterdale; and also from Colsterdale, *Tenthredo balteata* Klug, *T. colon* Klug, *Hoplocampa crataegi* Klug, *Nematus ribesii* Scop., *Pachynematus apicalis* Hart., *P. obductus* Hart.

RECORDER'S SECOND REPORT ON THE ACULEATE HYMENOPTERA IN YORKSHIRE

MICHAEL E. ARCHER

I have now been able to prepare a Yorkshire list of aculeate Hymenoptera (=YLIST) which on March 1987 contained 292 species as follows:

Family	No. species	Family	No. species
Dryinidae	18	Vespidae	7
Embolemidae	0	Sphecidae	70
Bethylidae	4	Colletidae	8
Chrysididae	15	Andrenidae	35
Tiphiidae	3	Halictidae	25
Mutillidae	1	Melittidae	1
Sapygidae	2	Megachilidae	13
Formicidae	17	Anthophoridae	19
Pompilidae	20	Xylocopidae	0
Eumenidae	12	Apidae	22

I am grateful to J. T. Burn for the lists of Dryinidae, Embolemidae and Bethylidae and to C. A. Collingwood for the list of Formicidae.

In addition to the above YLIST I have set up three other lists to deal with the following situations. The MLIST (Misidentification List) consists of published records for which voucher specimens are no longer available and which probably result from misidentifications. At present there are 13 species on the MLIST. The CLIST (Confirmation-needed List) consists of 22 species based on records for which voucher specimens are no longer available. CLIST records could probably be accepted but at present confirmation with new specimens is required before acceptance can be given. The ILIST (Species-under-investigation List) consists of four species and is based upon records that are currently under investigation to decide whether to place the species on the MLIST, CLIST or YLIST. The four listings have been placed on a word processor so that they can be readily up-dated and print-outs made available to interested persons.

The following 16 species are either new species recently recognized as occurring in the Watsonian county of Yorkshire or are recent records of old records whose validity has been doubted by some workers. Initials of collectors are as follows: M. E. Archer (M.E.A.), M. D. Barnes (M.D.B.), J. T. Burn (J.T.B.), A. J. Chitty (A.J.C.), J. D. Coldwell (J.D.C.), C. Devlin (C.D.), J. D. Hincks (J.D.H.), P. Skidmore (P.S.), F. Smith (F.S.), G. M. Spooner (G.M.S.), J. Wood (J.W.). Some of the specimens were found in the collections of the museums of Doncaster, Keighley and Manchester

University and I would like to thank the curators for permission to borrow and examine these specimens.

Chrysura radians (Harris, 1781). A cuckoo wasp which is moderately common throughout England as far north as Yorkshire and Cumberland.

V.C. 63. Askern (SE 51) (June 1976, J.T.B.); Barnaby Dun (SE 60) (June 1979, J.T.B.). Smith (1862) recorded this species for Yorkshire.

Dipogon subintermedius (Magretti, 1886) = nitidus (Haupt, 1927). A spider-hunting wasp which is strongly associated with dead wood; it is widely distributed throughout England and can be locally common.

V.C. 62. Strensall (SE 66) (July–August 1983, M.E.A.); Duncombe Park, Helmsley (SE 68) (July–August 1981–86, M.E.A., J.T.B.); Beningbrough (SE 55) (July 1985, M.E.A.).

V.C. 63. Blaxton Common (SE 60) (July 1978, J.T.B.).

Priocnemis fennica Haupt, 1927. This spider-hunting wasp has only recently been recognized; it appears to be distributed throughout England and can be locally common.

V.C. 61. Skipwith (SE 63) (Sept. 1986, M.E.A.).

V.C. 62. Cornelian Bay, Osgodby (TA 08) (Sept. 1986, M.E.A.).

V.C. 63. Near Wakefield (SE 32) (July 1852, F.S.); Thorne Moor (SE 71) (July 1983, J.T.B.); Howell Wood (SE 40) (August 1986, J.D.C.). The Wakefield specimen was discovered by G.M.S. at Oxford University Museum and its identity was confirmed by C. O'Toole. F.S. had misidentified this specimen as *Pompilus* (=*Dipogon*) *variegatus* (Linn., 1758) (Smith, 1852).

Anoplius infuscatus (Vander Linden, 1827). A frequent to common spider-hunting wasp of moist sand especially of coastal areas. Present in England north to Yorkshire and Lancashire.

V.C. 63. Crow Wood, near Finningley (SK 69) (July–August, 1983, 1986, J.T.B., M.E.A.). Corbett (1919) recorded a specimen of *Pompilus pectinipes* Smith, F(= *chalybeatus* Schiødte) from Bessacar, near Doncaster which might be regarded as this species. However a female specimen in Manchester University Museum dated August 1918 taken by H. H. Corbett at Bessacar is *Evagetes crassicornis* (Shuckard, 1837) so that this record cannot be accepted.

Tachysphex unicolor (Panzer, 1809). A black sphecoid wasp usually not very common and nesting in sandy soils. Previously recorded in England northwards to Lancashire and north Lincolnshire.

V.C. 63. Blaxton Common (SE 60) (June 1973, 1977, J.T.B.); Crow Wood, Finningley (SK 69) (June 1983, 1986, J.T.B., M.E.A.).

Crossocerus styrius (Kohl, 1892). A sphecoid wasp found throughout England but rare and local.

V.C. 63. Shipley Glen (SE 13) (June 1927, J.W.); Holmehouse Wood (SE 04) (Aug., Oct., 1934, 1937, J.W.); Armthorpe (SE 60) (July 1965, P.S.).

V.C. 64. East Morton (SE 14) (May 1981); Malham Tarn (SD 96) (July 1958, W.D.H.).

Psen bicolor Jurine, 1807. A sphecoid wasp which is associated with sandy places and usually not very common. Previously recorded in England northwards to Nottinghamshire and north Lincolnshire.

V.C. 63. Crow Wood, Finningley (SK 69) (Aug. 1979, J.T.B.). The records in Burn (1975) are in error and should be *Psen equestris* (Fabricius, 1804).

Pemphredon enslini (Wagner, A.C.W., 1932). A very rare sphecoid wasp only recorded from north-west Yorkshire and south Devon.

V.C. 65. Richmond Park (NZ 10) (1903, A.J.C.). These specimens were bred from dead wood, identified by Valkela and confirmed by G.M.S. The specimens are held at Oxford University Museum.

Pemphredon clypealis Thomson, 1870. A rare sphecoid wasp nesting in rotten wood. Previously recorded in England only as far north as Buckinghamshire and Bedfordshire.

V.C. 62. Duncombe Park, Helmsley (SE 68) (July 1985, M.E.A.).

V.C. 63. Ashfield, Thorne (SE 61) (June 1980, J.T.B.).

Passaloecus corniger Shuckard, 1837. A common sphecoid wasp previously recorded in England only as far north as north Lincolnshire.

V.C. 62. Duncombe Park, Helmsley (SE 68) (July–August 1981, 1983, 1985, J.T.B., M.E.A.); Sand Hutton (SE 65) (Sept. 1968, M.E.A.); Strensall (SE 66) (July 1983, M.E.A.).

V.C. 63. Denaby Ings (SE 40) (June 1970); Armthorpe (SE 60) (August 1985, J.T.B.).

V.C. 64. Hook Moor, Aberford (SE 43) (July 1936, J.W.); Grass Wood (SD 98) (June 1973, P.S.).

The Aberford record was probably referred to by Butterfield (1937).

Argogorytes fargeii (Shuckard, 1837). A rare sphecoid wasp previously recorded in England as far north as north Lincolnshire.

V.C. 62. Beningbrough (SE 55) (June 1986, M.E.A.); York district (June 1936, M.D.B.). The York district specimens are in the Manchester University Museum.

Hylaeus signatus (Panzer, 1798). A stem-nesting bee previously recorded only as far north as the Midlands and East Anglia.

V.C. 63. Sandall Beat Wood (Pot hill), Doncaster (SE 60) (July 1986, J.T.B.). Roebuck (1877) indicated that F.S. found this species at Woolley, near Wakefield (V.C. 63, SE 31). There has been doubt as to whether this record was based on specimens or on what might be found (Butterfield and Fordham 1930). As such Smith's manuscript records are not usually accepted.

Andrena tibialis (Kirby, 1802). A locally common early spring bee known previously in England from the south-east, north to Cambridgeshire but also from Lancashire.

V.C. 63. Blaxton Common (SE 60) (April–May 1985–86, M.E.A.). This species is another Smith's manuscript species (Roebuck 1877).

Lasioglossum laevigatum (Kirby, 1802). A widely distributed but a southern English mining bee with records also from Lancashire, Oxfordshire and Suffolk.

V.C. 63. Denaby Ings (SE 40) (June 1966, C.D.). This species is another Smith's manuscript species (Roebuck 1877).

Sphecodes puncticeps Thomson, 1870. Widely distributed in England, but rarely common, previously extending northwards to Gloucestershire and Lincolnshire.

V.C. 63. Armthorpe (SE 60) (July 1983, J.T.B.); Barnaby Dun (SE 60) (June 1986, J.T.B.); Sandall Beat Wood (Pot hill), Doncaster (SE 60) (June 1986, J.T.B.).

Nomada flava Panzer, 1798. A common bee, readily confused with *N. panzeri* Lepeletier, particularly in the male sex, and usually associated with southern and midland England.

V.C. 63. Sprotborough (SE 50) (May 1983, J.T.B.); Hatfields Lings, Dunsville (SE 60) (May 1974, J.T.B.). These specimens have been determined by G. R. Else but some doubt may be attached to their identity since they are males.

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BOOK REVIEWS

Lichens by **Jack R. Laundon**. Pp. 24, including line drawings, b/w and colour photographic plates. Shire Publications, Aylesbury. 1986. £1.25.

Multum in parvo: this slim booklet packs more pertinent information between its covers than many a more grandiose work. It provides an excellent introduction to a group of plants which have assumed particular importance in recent years due to their value as air pollution monitors. A model of its kind, this booklet will go a long way towards promoting wider interest in these fascinating plants.

MRDS

British Fungus Flora. 4 Pluteaceae: Pluteus & Volvariella by **P. D. Orton**. Pp. 99, including numerous line drawings. Royal Botanic Garden, Edinburgh. 1986. £8.00, paperback.

The most recent part in the series of important guides to British fungi. The keys to and descriptions of the 43 species of *Pluteus* and 11 species of *Volvariella* are meticulously detailed, as one would expect from this eminent mycologist who has spent 35 years studying them in the field. The figures, however, are rather basic line drawings, all 78 of them being packed onto seven sides. An essential work for all those studying agarics.

Sulfur Dioxide and Vegetation: physiology, ecology, and policy issues edited by **William E. Winner**, **Harold A. Mooney** and **Robert A. Goldstein**. Pp. xxiv + 593, including numerous figures and tables. Stanford University Press, California. 1986. $65.00.

In the present climate of anxiety regarding aerial pollution and its effects on plants, this is a most timely and informative volume. The various chapters, contributed by well-known North American and European scientists, add considerably to our knowledge, particularly in the fields of SO_2 effects on plant growth, plant metabolism and plant communities, as well as on issues of pollution management.

It is pleasing to find a single comprehensive (37 pages) bibliography to all chapters. An attractively produced book, well laid out and scientifically sound, as we have come to expect from this publishing house.

MRDS

Heathlands by **Nigel Webb**. Pp. 223 (including numerous figures and b/w plates), plus 8 pages full colour photographs. Collins. 1986. £25.00 hardback, £9.95 paperback.

A much welcomed addition to the 'New Naturalist' series, covering as it does the flora and fauna of habitats under particular stress in Britain today. This book will provide an ideal companion volume to W. H. Pearsall's remarkable work on the *Mountains and Moorlands* first published in the same series thirty-seven years ago. *Heathlands* is attractively produced, and the simultaneous publication in paperback will be especially welcomed by students.

LITTLE OWL

Photo: Arthur Gilpin

On 10th May 1842 Charles Waterton released five 'civettas' (Little Owls) bought in Rome, in his grounds at Walton Hall near Wakefield. In a letter to a friend, dated September 1st 1848, he mentioned the building of a tower in his flower garden, with nesting holes for Starlings and two larger cavities for Little Owls. It seems fair to assume that there was at least one pair of the owls alive at that date, but unfortunately the species failed to establish itself.

It was left to the large-scale importations of those birds in the seventies and eighties of the last century, to bring about the permanent residence of Little Owls in the British Isles. Released in both Kent and Northamptonshire, some of those birds moved north, and they were first proved to nest in the East Riding in 1922, and in the West three years later. The first Little Owl's nest and eggs that I saw was at Methley in 1936, and there were other breeding pairs in the area at that time.

FUNGUS FORAYS IN 1986
Bridlington, 8–12 May
Kirkbymoorside, 25–29 September

T. F. HERING

Both these events were well attended, and the fungal finds were richer than in 1985. Our meeting at Bridlington used a workroom at the Red Cross Centre, and coincided with the peak of spring fungi. The record of *Verpa* at Boynton was the first at any foray since 1908; remarkably, the same fungus was found near Ilkley by Mrs Gramshaw at about the same time. At Kirkbymoorside we used a workroom at the White Swan; we were all pleased that Mr W. G. Bramley is still in good health, and was able to put in an appearance.

I am indebted to Mr M. C. Clark for a very important list of Ascomycetes.

* = new to Yorks.

LIST OF SITES

Spring
- T = Thorpe Hall, TA/110672
- D = Danes Dyke, TA/213725
- B = Boynton Willowgarth, TA/126677
- S = Sewerby Hall, TA/204690

Autumn
- R = Riccall Dale, SE/633842
- BH = Birch Hagg, SE/675860
- RS = Robson Spring, SE/622814

MYXOMYCETES

Ceratiomyxa fruticulosa R
Craterium minutum D
Comatricha tenerrima B
Physarum bivalve B
Trichia floriformis B, S
T. scabra B

MASTIGOMYCETES

Plasmopara nivea T

ASCOMYCETES

Discomycetes

Ascocoryne cylichnium R
Cheilymenia raripila R
Crocicreas starbaeckii B, S
Dasyscyphus dumorum D, B
D. grevillei D, B
D. mollissimus B, S
D. nidulus B
D. palearum B
Drepanopeziza salicis B*
Echinula asteriadiformis D*
Hyaloscypha velenovskyi B
Mitrophora semilibera B
Mollisina acerinum D
Orbilia luteorebella D
Peziza micropus T, S
Pirottaea lamii B*
P. nigrostriata B
Ploettnera exigua S
Pyrenopeziza escharodes B, S
P. lychnidis T, D, B, S
P. petiolaris D, S
P. pulveracea T, B*
P. urticicola B, S
Stictis stellata B*
Tapesia lividofusca B
Unguicularia scrupulosa B
Verpa conica B

Other Ascomycetes

Anthostomella punctulata T*
Apiognomonia errabunda T
Ceratocystis ulmi T
Cordyceps ophioglossoides R
Gnomonia setacea T
Leptosphaeria typharum T

Microthyrium cytisi var. *ulicis* D
Plagiostoma inclinata D, S
Sydowiella fenestrans D

BASIDIOMYCETES

Rust and Smut Fungi
Urocystis eranthidis on *Eranthis hiemalis* T, S

Heterobasidiomycetes
Tremella foliacea R, BH

Aphyllophorales
Calyptella capula B
Coniophora puteana RS
Fistulina hepatica R
Fomes fomentarius R, RS
Peniophora incarnata T
Phellinus ferreus BH*
Polyporus badius R
Stereum sanguinolentum BH
Typhula erythropus BH
Tyromyces kymatodes R

Agaricales
Amanita echinocephala BH*
A. phalloides R
Armillaria bulbosa BH
Clitocybe fragrans R
Cortinarius leucopus RS
Eccilia rhodocyclix BH*
Hebeloma sacchariolens R
Lentinellus cochleatus R
Lyophyllum connatum R
Naucoria bohemica BH
Panellus serotinus R
Pluteus romellii RS
P. umbrosus R
Psathyrella prona R
Resupinatus applicatus D

Fungi Imperfecti
Camarographium stevensii D*
Diplosporium delastrei T*
Lemonniera terrestris BH*
Margaritispora aquatica BH

BOOK REVIEWS

Thorne Moors Birds and Man by **Martin Limbert, Roger D. Mitchell** and **R. J. Rhodes**. Pp. v + 95 (including text figures), plus 14 pages b/w plates. Doncaster & District Ornithological Society. 1986. £3.00 paperback (including postage & packing from: Martin Limbert, 23 Brockenhurst Road, Hatfield, Doncaster DN7 6SH).

The Insects of Thorne Moors by **Peter Skidmore, Martin Limbert** and **Brian C. Eversham**. Pp. 64. 1987. Sorby Natural History Society, Sheffield. £2.00 paperback (including postage & packing from: Martin Limbert — address as above).

Thorne Moors, much studied by naturalists in the 19th century, are again under scrutiny. We are indebted to the enthusiasm of numerous South Yorkshire naturalists for drawing our attention to their interesting flora and fauna through extensive field activities which are now culminating in a number of useful publications. The two under review are attractively produced accounts of the birds and insects, the former well-illustrated and including a wealth of general background and ecological information. Both booklets contain valuable checklists and detailed bibliographies, and provide welcome records and coverage of an area of Yorkshire neglected for so many years.

MRDS

Wildfowl in Great Britain by **M. Owen, G. L. Atkinson-Willes** and **D. G. Salmon**. Pp. xiii + 613, includes numerous maps, figures and tables. Cambridge University Press. 2nd Edition. 1986. £30.00

The first edition of *Wildfowl in Great Britain*, edited by G. L. Atkinson-Willes, was published in 1963, and for nearly 25 years has been the standard work on the distribution and status of ducks, geese and swans in England, Scotland and Wales. This second and much enlarged edition is destined to perform the same service for the next quarter century.

A much wider range of data was available for this edition which has been thoroughly analysed using the latest computerized techniques. The book is divided into four main sections: 1 techniques used to collect the relevant information, 2 treatment of the country region by region, 3 species accounts of all of the British wildfowl and 4 a discussion of conservation in a changing environment.

A vast amount of information is presented, including 43 location maps of the major British wildfowl regions, numerous graphs and no less than 271 tables of data. Specific information however is easily located, using the very good general index. There is also a site index giving a four-figure map reference for each locality.

Naturally, in the years since the publication of the first edition, wildfowl populations have changed, many habitats have been modified and some, alas, have disappeared, but the picture is by no means one of doom and gloom. The entry under Teesmouth for example reports that the area now 'holds more ducks than in the 1950s', this in spite of the large reclamation of mudflats in recent years, and the fact that the duck flocks are 'hemmed in by wirescapes and petrochemical complexes.'

On a national scale, many species have shown an increase in wintering populations, some dramatically so. In the early 1960s, less than 500 Bewick's Swans wintered in Britain, then, during the late 1970s the population increased at an annual rate of 16 per cent, resulting in a 1980 count of 4500 birds. Increased populations are also noted for Brent Geese, Pintail, Shoveler and Teal and many others.

This book is a fitting tribute to every wildfowl-counter who has braved the winter weather to complete his record card on 'duck count day'. The efforts of these hundreds of dedicated fieldworkers have been correlated to produce what must be one of the most comprehensive surveys of any bird group anywhere. Unfortunately Peter Scott's fine colour plates which graced the first edition have not been included in the present volume, presumably for economic reasons. However, his many line drawings are still an attractive feature. Every serious ornithologist will need access to this book, and even at £30 many will want it on their own shelves.

JKS

Earth by **Anne H. Ehrlich** and **Paul R. Ehrlich**. Pp. 258, with numerous b/w and full-colour illustrations. Thames Methuen. 1987. £14.95.

Earth offers a chilling diagnosis of the planet's state of health, looking at the origins, character and extent of the changes brought about by human actions.

This is an interesting and gripping account of the origin of the Earth which the authors have traced from the time that it was quite hostile to life in most of its present forms. They carry their theme through to the present human predicament and suggest what changes need to be made to resolve it. It is a book which calls for deep thought and has been compiled in a most detailed manner by the two Doctors Ehrlich — a husband and wife team — assisted by much research by individuals called upon to review and comment upon all or part of the manuscript. *Earth* is well supplied with good black and white photography interspersed with graphic colour plates of life in various parts of the world concerning the natural phenomena and people of those areas going about their daily lives.

A book to be recommended for the more serious and dedicated reader.

MET

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Separates of the collected instalments which appeared serially in *The Naturalist* (1967–70) are available from Dr W. A. Sledge, Department of Plant Sciences, University of Leeds, Leeds 2. Price £1 plus 18p postage.

The Biography of Britain's First Professional Mycologist

MORDECAI CUBITT COOKE

Victorian Naturalist, Mycologist, Teacher and Eccentric

by Mary English

This is the story of the son of a village grocer who, by his own efforts and with no formal education, became first a teacher in a slum school in London, then an adult educationalist, the curator of economic products at the India Museum, and one of nineteenth century Britain's leading mycologists, crowning his working life with his appointment as the first cryptogamic botanist at the Royal Botanic Gardens, Kew. Cooke attended the Yorkshire Naturalists' Forays and counted Alfred Clarke and Charles Crossland amongst his friends.

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Materials for a history of botanical investigation on Thorne Moors — *Martin Limbert*

The natural history of Domesday Cheshire — *D. W. Yalden*

N. J. Winch's herbarium specimens in the National Botanic Gardens, Dublin — *E. Charles Nelson*

A new species of scuttle fly (Diptera, Phoridae) from Cumbria — *R. H. L. Disney*

Notes on the British species of *Tephrocybe* which have been found on burnt sites — *A. W. Legg*

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

Photographic Plates

Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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MATERIALS FOR A HISTORY OF BOTANICAL INVESTIGATION ON THORNE MOORS

MARTIN LIMBERT
Museum and Art Gallery, Doncaster

Thorne Moors, a degraded raised mire 15 km NE of Doncaster, lies to the NE of Thorne and SSW of Goole, in a flat, low-lying region, a part of the extensive Humberhead Levels. Although situated mostly in Yorkshire, its easternmost part extends into Lincolnshire. It is defined and described in detail by Limbert *et al.* (1986). The site has attracted the attention of generations of botanists, and a succession of significant discoveries of vascular plants has been made. The notes which follow present a summary of information garnered on the history of botanical investigation on Thorne Moors, to the end of 1966. There is undoubtedly much more data available, which hopefully will be sampled in the future. In particular, the examination of local newspapers and old herbaria should prove rewarding. A greater understanding of pre-1830 interest in Thorne Moors is desirable, particularly that of the eighteenth century, and more information on the part played by Thorne botanists themselves would be worthwhile.

George Stovin, a Crowle antiquary who died in 1780, wrote a manuscript history of the drainage of Hatfield Chase, which he apparently intended to publish. This manuscript, now at the University of Nottingham Library, contains information dated to 1753. It has two pagination sequences, the first of which ('A Brief account of the Drainage . . .', published in full by Jackson 1882) contains the earliest recorded reference to the flora of Thorne Moors:

> It affords plenty of cranberries, and an odoreferous shrub called gale; some call it Sweet willow, or Dutch myrtle.

Arthur Young visited Thorne Moors in 1768, and referred to the presence of *Calluna vulgaris* (L.) Hull on the edge of the moorland (Young 1771). The first located purely botanical reference is Turner and Dillwyn (1805), in which records from the Rev. William Wood were included. Following Hunter's (1828) brief mention of Thorne Moors plants, the next, and more significant reference is that of a Thorne Quaker, William Casson. This volume, *The History and Antiquities of Thorne*, published in 1829, is notable as the earliest source to include an extended description of Thorne Moors, including features of the vegetation. The seventh edition of Withering (1830) lists Thorne Moors records from Turner and Dillwyn, and others (pre-1813) obtained by Edward Robson.

A Thorne miller, William (or Robert, depending on source) Harrison, described by Hatfield (1866–70) as a 'most indefatigable' botanist, who was possibly prompted to work Thorne Moores by knowing Casson, or reading his *History*, discovered one of Britain's rarest plants, *Scheuchzeria palustris* L., on the moors in 1831 (Schroeder 1852, Hatfield 1866–70, Anon. 1921). Harrison had some contact with a leading Doncaster botanist, Samuel Appleby, who made the *Scheuchzeria* record widely known by including it in a published paper (Appleby 1832) and transmitting 'many specimens to a Fellow of the Linnaean Society for distribution, among whom a preserved plant for the herbarium would be quite a desiderata' (Hatfield 1866–70). The interest in *Scheuchzeria*, then only known from two other British sites (Sledge 1949), and the wider potential that this occurrence signposted, led to increasing botanical endeavour on the moorland, and the resultant addition of a number of finds to the site's inventory of rare and characteristic species. In the 40 years that *Scheuchzeria* was known to persist at Thorne, visitors in search of this and other plants included (known or apparent supporting references bracketed) James Backhouse (1794–1869) and his namesake son (1825–90), the latter describing Casson in 1884 as 'my now aged friend' (Baines 1840, Backhouse

1884, Hanbury 1890), Henry Baines (Lees 1888, Wilkinson 1897), John Bohler (Bennett 1921), Phineas Ellis (Woodruffe-Peacock 1920–1), John Hardy (Christy 1883, Lees 1884), Rev. W. T. Humphrey (Woodruffe-Peacock 1920–1), Peter Inchbald (1816–96) (Inchbald 1848, Lees 1888), Dr F. A. Lees (Davis and Lees 1878, Lees 1888), Rev. J. K. Miller and his son T. E. Miller (Miller 1985) and W. Tune (Woodruffe-Peacock 1920–1).

Following the founding of the Doncaster Lyceum in 1834, and for the decade of its existence (Hatfield 1866–70, Thrall 1975), an interest in Thorne Moors as a source of specimens was probably fostered by the encouragement to gather and exchange specimens that such contact allowed. Subsequently, the Doncaster Philosophical Society flourished, from 1863–75 (Thrall 1975), and some of its members, as in the Lyceum, are known to have had an interest in Thorne Moors, through tangible botanical results have not been discovered from either organization. In 1836, the Thorne Literary and Scientific Association was formed, 'on the principles of the Doncaster Lyceum', as noted in the *Doncaster, Nottingham and Lincoln Gazette* of 26th February (Anon. 1836). This again must have provided a centre of interest in Thorne Moors, the moorland being so close and environmentally dominating. The Association held a yearly meeting at 'Casson's Garden', situated on the edge of the moorland (Tomlinson 1882, Limbert 1987). William Casson himself was seemingly involved with the Association (Hatfield 1866–70, Skidmore *et al.* 1987), and for example spoke about 'the rare and curious plants which "blush unseen" on the Thorne Moors' at the meeting of 22nd January 1842 (Anon. 1842). Casson maintained his interest in later years, discovering *Dryopteris cristata* (L.) A. Gray c.1856 (Backhouse 1884), and issuing an expanded second edition of his *History* in 1869. This latter, coupled with the first volume of C. W. Hatfield's *Historical Notices of Doncaster*, published in 1866, usefully directed local attention at the flora of Thorne Moors in that decade.

Broader botanical compilations, drawing on the increasing number of records available, also included some Thorne Moors data (e.g. Watson 1835, Baines 1840, Baker and Nowell 1854, Miall and Carrington 1862), as did scattered notes and articles (e.g. Inchbald 1848, Kenyon 1864). However, the years from the 1830s–60s remain a rather amorphous period, with few details located beyond the dates of visits by individual botanists and a few indications of their more interesting finds.

An apparent change becomes evident in the 1870s. The earlier period of botanical interest, when Thorne Moors was the richest locality for marsh plants in the north of England (Sledge 1941), was symbolically ended in 1870, when the last living specimen of *Scheuchzeria* at Thorne was found. As the most ecologically exacting of all the moorland rarities, this species was perhaps inevitably the first victim of accelerating moorland exploitation (Lees 1888, Limbert 1987). A new approach to recording was crystallizing in the 1870s, centred on the increasing involvement of organized natural history. An uncritical regard for the moorland as a source of herbarium specimens, or records of broad geographical significance, was being deepened by a growing awareness of biology, ecology, floristic characterization and refined bio-geographical recording. The decade saw the local genesis of enquiry into the flora of specified areas by the Yorkshire Naturalists' Union and new societies, beginning with the Goole Scientific Society, which existed from 1875–86. In the former year, the society chose Thorne Moors for its first excursion, 'a most appropriate and interesting locality for the first meeting' (Birks 1905), when 'Several interesting plants, including *Vaccinium Oxycoccos*, the three British species of *Drosera*, *Andromeda polifolia* and *Comarum palustre*, were found . . .' (Parsons 1875).

Goole's botanists included Thomas Birks jnr and the highly regarded Dr H. F. Parsons, who became the society's respective official recorders for 'Botany' and 'Cryptogamic Botany'. The society's *Annual Report* for 1875–6 records:

> Your Committee would point out that the flora and fauna of the south-eastern corner of the West Riding have been but little investigated, and therefore that the field naturalist has a better chance here than in more attractive and better

worked neighbourhoods of adding his stone to the Temple of Knowledge [Morris *et al.* 1876].

This potential for investigation is readily apparent. In the years leading to the formation of the Goole society, the distribution of other natural history organizations in Yorkshire was centred on the south-western part of the West Riding (Roebuck 1914). Eastwards, including the whole region surrounding Goole, specialist societies — reflecting the essentially rural nature and outlook of the population — were very sparse. This lack of interest was compounded by a widely held fallacy that Goole's countryside, at the head of the Humber estuary, was mostly flat, barren and uninspiring for the naturalist (Birks 1878, Hunter and Parsons 1878). In the Goole Scientific Society's *Annual Report* for 1876–7, Hunter and Parsons (1877) noted:

> Your Committee are glad to be able to chronicle the commencement of a systematic attempt by the Society to work out the Natural History of the neighbourhood. The following members have undertaken to keep records of the observations made in their several departments . . .

The list included Birks, as above, who subsequently wrote an account of the Goole flora, delivered at the society's meeting of 27 February 1878. It was published in the *Goole and Marshland Weekly Times* of 8 and 15 March and the *Goole Telegraph* of 12 March. A reprint from the former newspaper was included with the society's subsequent *Annual Report* (Birks 1878, 1878a, 1878b). In his paper, Birks described Thorne Moors as 'one of the most interesting and unique collecting grounds in Yorkshire', adding that on the moors 'we find some of the rarest of our British wild flowers'. In the following year, Birks reported on botany on 17 January, and his report was subsequently published in the *Goole Weekly Times* (Hunter *et al.* 1879), and reprinted with the society's *Annual Report* (Birks 1879). The society resolved to establish a study area extending over a 20 miles radius of Goole (Hunter and Parsons 1878), to which Birks adhered in his reporting. The formation of an herbarium was also undertaken, which by 1879 comprised '450 species of flowering plants, out of 660 known in the district', in addition to mosses and other plants (Hunter *et al.* 1879). With the exception of one or two sheets, the herbarium probably no longer survives (Limbert in prep.).

Unfortunately, both Birks and Parsons eventually left the Goole district, the departure of the latter in 1879 being perhaps the greatest blow to the vitality and organization of the Society, which probably never really overcame so serious a loss. Almost certainly, it is significant that the Society's *Annual Report* for the year 1878–9 was its last. This repository of members' records and other contributions was brought to a premature end, although luckily, the minute books survive intact.

About 20 years after he left Goole, Birks accepted an invitation to briefly revisit the town from his home at Yarm-on-Tees, to help launch a new organization, the Goole Scientific and Field Naturalists' Society. At this first meeting, on 24 October 1905, Birks read a paper on the work and members of the extinct Goole Scientific Society (Birks 1905). Sheppard (1916), when noting the formation of the new body, commented that 'an 8-page reprint from the "Goole Times" refers to this, and includes a paper by Mr Birks on "The Work of the Old Members". Birks embodied a link between the original and the nascent societies, although the new organization was to prove less seminal and successful; it seems to have lasted less than a decade, had no distinguished workers, and produced, apart from an occasional pamphlet, only one volume of *Transactions* (Sheppard 1916). This, covering 1908–9, indicated however, that the Society had 'Phanerogamia' recorders (Rev. W. Booth, A. E. Greaves), and that its excursions included Thorne Moors.

In the years from the 1870s, individual and corporate interest — often fleeting — in fieldwork at Thorne significantly widened, including for example, societies as disparate as Barnsley Naturalists' Society (Lister 1883) and Ackworth School Natural History Society (Anon. 1888). The Hull Scientific and Field Naturalists' Club launched its *Transactions* in 1898, and the first item published was a paper on the natural history of

Thorne Moors and the immediate vicinity. This was compiled by Thomas Bunker, a leading member of the old Goole Scientific Society, who was also a 'corresponding' member of the Hull club. He had delivered his illustrated paper to the Hull club on 2 March 1898, after which it was published (Bunker 1898) and later republished in a slightly modified form (Bunker 1905, Limbert 1983). Thomas Bunker seems to have first visited Thorne Moors c.1876 under the guidance of Birks (Limbert 1983); he eventually became an acknowledged expert on the site, including its vascular plants, which his catholic interests encompassed (Limbert 1985) and allowed him to include in his wide ranging paper. In 1900, the Hull club undertook the first of a number of excursions to Thorne Moors (Sheppard 1901), that of 24 August 1907 at least, being led by a Goole naturalist (Anon. 1908). On 1 August 1904, the Doncaster Scientific Society held its initial Thorne Moors foray, when 'Botanists had a most interesting day among marsh and bog plants', and *inter alia*, encountered *Peucedanum palustre* (L.) Moench (D.S.S. minutes). The results of visits by the Doncaster — and other — societies are encompassed in minute books, newspaper accounts and reports or more specific items in specialist literature. A typical excursion by the Doncaster society to Thorne is described, for example, in the *Doncaster Chronicle* of 4 July 1913 (Anon. 1913).

Beyond the local societies, but sharing their interests, and often also their personnel, was the Yorkshire Naturalists' Union. Although its origins extend back to 1861, the Union did not become involved with Thorne Moors until the 1870s. Its publications, *The Naturalist* and *Transactions*, became a focus for records and more detailed work, gathered as part of formalized local or county recording, or derived from 'freelance' individual work. In addition, the Union began to include Thorne Moors in its programme of excursions, beginning, at the instigation of the Goole Scientific Society, on 6 August 1877 (Anon. 1877, 1877a, Roebuck 1877). Further Union excursions were undertaken in 1881, 1895 (preceding a joint meeting of the Yorkshire and Lincolnshire Naturalists' Unions elsewhere) and 1907. Preliminary, and often informative excursion circulars were issued, and reports subsequently compiled for *The Naturalist* (not 1895), with notable or interesting records sometimes repeated elsewhere. This pattern of Union excursion documentation has been maintained to the present, with the known published literature listed by Limbert (1987a). A longer-term Union survey of Thorne Moors — including botanical investigation — was suggested as a direct result of the 1907 excursion, but had to be abandoned when the owners and tenants of the moorland refused permission for the necessary visits to be made (Anon. 1909, Smith 1909, 1909a). The survey was probably the idea of Dr H. H. Corbett, a prominent member of both the Union and Doncaster Scientific Society. At that time he knew Thorne Moors well, and was in addition, aware of its gradual destruction (Corbett 1911), a fact which, understandably, has permeated appreciation of the moorland flora ever since the mid-19th century (Casson 1869) or earlier.

From the 1870s, the relevant summary publications of botany in Yorkshire (Davis and Lees 1878, Lees 1888, Baker 1907, Lees 1941) contained significant numbers of Thorne Moors records. A quite different piece of work, analyzing plant ecology, was the Rev. E. A. Woodruffe-Peacock's paper 'The ecology of Thorne Waste', published serially in *The Naturalist* (Woodruffe-Peacock 1920–1). He first knew the moors well in 1874, and contributed a section on 'Ecological Botany' to the account of the 1907 Yorkshire Naturalists' Union excursion (Woodruffe-Peacock 1907). However, his 1920–1 paper was the real culmination of a lifetime's interest in Thorne Moors, and represented the results of some original thinking. Woodruffe-Peacock acknowledged the influence of the Rev. W. T. Humphrey, whom he knew in at least the 1870s, in suggesting the value and possibilities of an ecological approach. Humphrey himself may have some claim to be regarded as the first plant ecologist on Thorne Moors, though firm proof is lacking. He was vicar of Eastoft when Woodruffe-Peacock knew him, and is therefore likely, living so close, to have known the moors. The study of plant ecology in the area did not re-emerge until 1969 (Shimwell 1970).

Much of the interest from the 1920s–60s centred on refinding the rarer plants known

to earlier generations, occasionally adding new ones, and latterly, 10 km square mapping. The Yorkshire Naturalists' Union made further visits in 1934, 1946 and 1966. Doncaster Scientific Society continued to undertake periodic visits to the moorland, though with none (in the period under review) beyond 3 July 1955, when *Kalmia angustifolia* L. was the best find (Dallman 1955), a species originally introduced in the ?1830s by William Casson or his brother John (Limbert 1987). Two of the Doncaster society's leading botanists, A. A. Dallman and Dr S. P. Rowlands, had some interest in the moors, the latter also visiting the locality with Dr J. M. Taylor. As Medical Officer of Health for Thorne Rural District, and with an extensive private practice, Taylor worked in the town from c.1912, apart from a break during the First World War. He sedulously investigated the botany of the district until his death in 1947 (Rowlands 1947, Dallman 1947, Sledge 1947), and Sledge (1948), writing in *The Naturalist*, remarked:

> The [Botanical Records] Committee and Union have suffered a heavy loss through the death of Dr J. M. Taylor . . . In recent years Dr Taylor has worked energetically at the flora of the Thorne area and our recent reports bear ample evidence of the success of his investigations. He had the advantage of residing in an area which had previously lacked a resident botanist and the thoroughness with which he searched the district added much to our knowledge of plant distribution in this outlying part of the county. He also succeeded in refinding some of the rarer plants of Thorne Moor known to the botanists of last century but familiar to this generation only as printed records of dubious present day validity.

Taylor was actually the latest of a trio of Thorne botanists (with William Harrison and William Casson), although he was the only worker living locally in the first half of the present century. Taylor's most significant find, in Rowlands' company, was confirmation of the occurrence of *Viola persicifolia* Schreber (see Taylor 1943, Sledge 1943). Dr W. A. Sledge first visited Thorne Moors, in the company of Rowlands and Taylor, in 1941 (Sledge 1941), and the former made a number of subsequent visits, reporting on the fortunes of the *Viola* (Sledge 1950, 1953). Other details of fieldwork published in the 1940s/50s are listed by Limbert (1987a), and Taylor's annotated textbooks, now housed at Doncaster Museum, contain many records of noteworthy finds.

Another significant fieldworker was William Bunting, who moved to Thorne in 1948. He too came to know the moorland flora, although his interests encompassed a much wider range of subjects. He was the first to appreciate the importance of the old Dutch peat 'canals' (see Limbert 1986, Smart *et al.* 1986) as both a refuge for rare species and as a niche for some remarkable plant communities (Shimwell 1970). By the middle of the present century, the inexorable destruction of Thorne Moors by drainage, commercial peat removal and land reclamation was causing Bunting great concern. This erosion of the site's interest is exemplified by the report on the Yorkshire Naturalists' Union excursion in 1966:

> The whole region has been so modified over the past century by peat extraction and burning that no part remains unaltered and the existing flora is only the impoverished remnant of earlier days [Sledge 1966].

In a purist sense this was true, but as Bunting had discovered, the natural richness of Thorne Moors had not entirely faded, and relatively, was still worthy of preservation. In the late 1960s, as exactly a century before, the direction of interest in the flora of Thorne Moors was about to alter. This was stimulated by conservation-based endeavour catalysed by Bunting; its origins have been described by Skidmore (1970), and the course of events is still unfolding.

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BOOK REVIEWS

Provisional Keys to British Plant Galls, edited by **F. B. Stubbs**. Pp. 85, with numerous line drawings. British Plant Gall Society, 22 Annasgarth, Harmby, Leyburn, North Yorkshire, DL8 5PJ. 1986. £4.50 paperback.

This little book is another personal triumph for Fred Stubbs; having founded the British Plant Gall Society, he has now coerced its members into providing this essential tool for field workers, a pocket-sized key to more than 500 galls arranged in alphabetical order of host plants by genus. Identification is aided by location of gall on plant, brief descriptions and line illustrations. Helpful additions are a glossary, a list of synonyms and a bibliography. The first printing rapidly sold out and on reprinting the opportunity was taken to correct a few typographical errors. Remarkable value for money, this Key should open fresh fields of interest to naturalists and win many new members for the British Plant Gall Society.

LLI-E

THE NATURAL HISTORY OF DOMESDAY CHESHIRE

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Introduction

The current interest in the Domesday Book, consequent upon its ninth centenary in 1986, has prompted this examination of its natural history interest. The Domesday Book was, essentially, a tax assessment and as such has only indirect natural history interest. It does provide an indication of the relative density and distribution of people, ploughed land, pasture, meadow and woodland across the counties of England, and, of these, the distribution of woodland is particularly of interest to a naturalist, in view of its scarcity at the present time. In a few counties, among them Cheshire, two other items of particular interest were also listed by the survey, hays and hawks' eyries. There is in the Domesday entries a very close association between these three and, because they provide the same indications for a naturalist, this account reviews these three categories together.

Sources

The valuable reviews of Domesday geography edited by Professor H. C. Darby are perhaps not as well known to naturalists as they should be; the general summary he presents in volume 6 of his series (Darby 1977) is an essential starting point for this or any other study of the Domesday evidence, as is the specific chapter by Terrett on Cheshire (Terrett, in Darby & Maxwell 1962). In extracting detailed evidence and mapping it, I have not followed their maps, but assembled the details directly from the Cheshire volume (Morgan 1978) in the series edited by J. Morris.

Woodland

Most of the entries for woodland in the Cheshire volume are relatively straightforward; they tell us that there was woodland so long and so wide. Thus, in Macclesfield, '*Silva vi leuu lg, iiii lat*', 'woodland 6 leagues long and 4 wide'. In a few cases we are only given one measurement; at Tattenhall, for example, 'there is one league of woodland'. In all such cases, I have assumed that the woodland was both as long and as wide as the distance given. There is one small hint that justifies this assumption; Marton has two entries, one of which tells of 20 perches of woodland, but the other actually specifies woodland 20 perches long and as wide.

The measurements used are mostly leagues and furlongs. Usually leagues are whole numbers or a half league, though there is one record, Dunham (on the Hill) of woodland 1/2 league long by 1/4 league wide. Modern dictionaries suggest that a league equals 3 miles, but it is believed (Darby, 1977) that the Domesday league was 1½ miles or 12 furlongs. Furlongs are usually single, though measurements of 2 and 3 furlongs also occur, as do several records of 40 perches, which, as one perch = 5½ yards, also equals 220 yards or 1 furlong. There is also one measurement of 4 perches (at Wimboldsey). The most puzzling measurement is the use of the acre as a linear measurement; at Hampton, for example, there was woodland 5 acres long and 2 wide, while at Bunbury the woodland was 1 league long and 1 acre wide. We can be sure that this (linear) acre was less than a furlong long, since at Tetton the woodland was 40 perches long by 1 acre wide. One possibility is that the linear acre was 4 perches (i.e. 1 chain) long (Darby, 1977; Rackham, 1986): this carries some conviction, because the modern (areal) acre would then be 1 furlong long by 1 chain wide, which would be a likely way to measure such an area for early surveyors. Another, less likely, possibility is that such an acre was 69 yards long, so that the modern acre is 1 (linear) acre square. It is less easy to see how such a measure would have come into use, but I have adopted this interpretation because it actually overestimates the extent of woodland in the less wooded parts of the

county. In either case, woodland measured in acres was clearly very much smaller than woodland measured in furlongs or leagues.

If the problems of evaluating these lengths are settled, there still remains, as Darby (1977) notes, the question of how to interpret the measurements. Are we being told the maximum lengths and breadths of the woodland, the average diameters in two opposing directions, or are these some conventional, taxable, leagues and furlongs that were scarcely related to real measurements? Given the presumably primitive surveying methods available, we may suspect that the measurements were obtained by someone pacing in standard directions, or perhaps walking for a certain time at a standard speed, at least for woodland measured in leagues; furlongs, perches and acres could perhaps have been surveyed with genuine surveying chains. I have assumed for present purposes that we are being given some sort of outer measurements for the length and breadth of actual woodland; further, to provide comparability across the county, I have multiplied the two measurements to give an area, despite Darby's very justified criticism of such a naive approach. I have done this even with measures of (linear) acres, so that I have evaluated woodland of 4 acres (at Norton) as an area of 16 modern acres (i.e. 4 linear acres by 4 linear acres); actually I have rendered all these as hectares, so the figure used is 6.4 ha. The comment above still applies – woodland measured in acres is so small compared with the major areas of woodland that the precise result in these few cases is not very important.

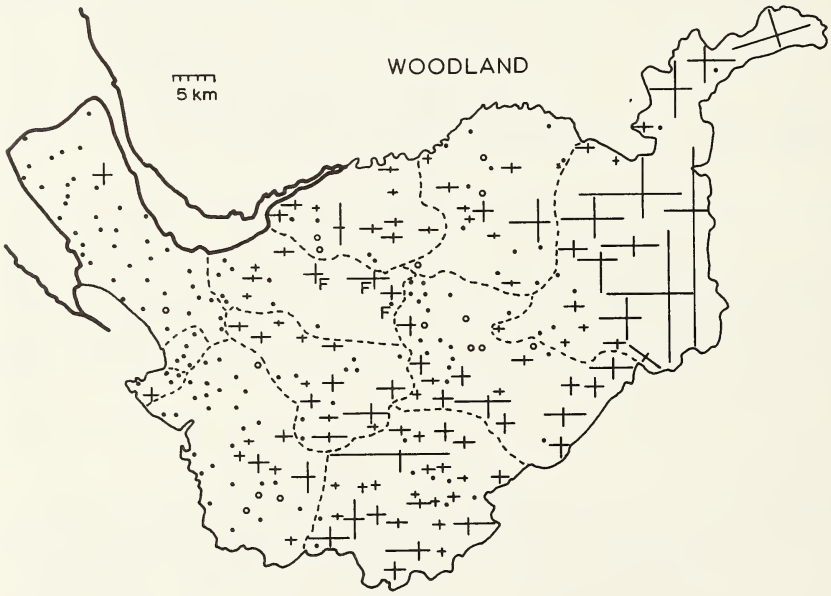

FIGURE 1

The distribution of woodland in Domesday Cheshire. The lines, drawn to scale, indicate the length and breadth of woodland mentioned in the Domesday Book; the crosses are located at the manors named, where possible, but are displaced in Macclesfield Hundred so that they do not overlap. Places named in Domesday but with woodland not mentioned (which therefore constrain the location of neighbouring woods) are indicated by dots; places with small amounts of woodland – less than 144 ha (½ league by ½ league) are shown as hollow circles. Three manors which refer to the neighbouring forest (by implication, Delamere Forest) are indicated by F.

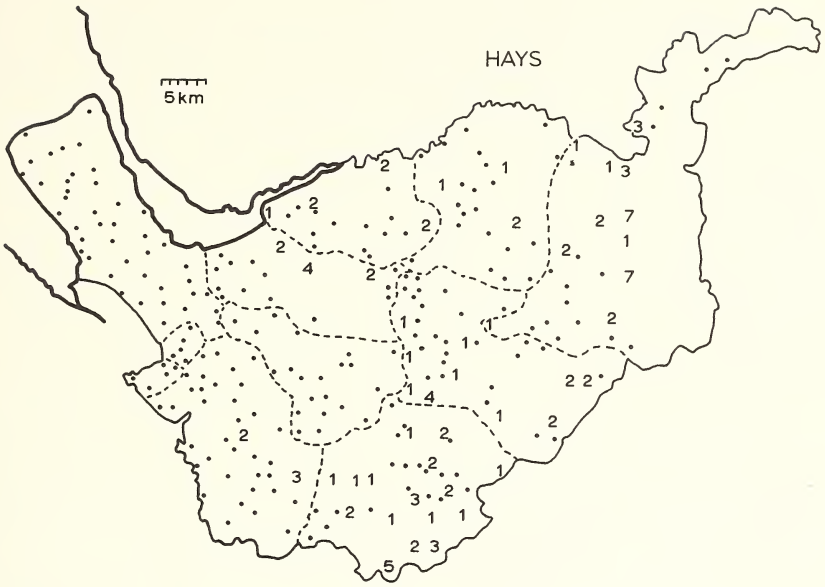

FIGURE 2
The distribution of hays in Domesday Cheshire.

The results of this are shown on Figure 1, and summarized by Domesday Hundreds in Table 1. It is immediately evident that the west of the county, Wirral and Broxton Hundreds, contained little taxable woodland; by contrast the south east and east of the county were heavily wooded, with a nominal 579.93 km^2 of woodland in Macclesfield Hundred. The linear extent of the woodland is plotted to scale on Figure 1, following largely the conventions used by Darby and his co-authors. However, woodland taxed in one manor must have been distinct from that belonging to its neighbours, so I have distributed the symbols so that they do not overlap. This is particularly important in Macclesfield Hundred, where the symbols in Figure 98 of Terret (1962) overlap extensively; spread out they completely cover almost all of the east of the Hundred. Adlington is particularly difficult to map, having woodland 11 leagues long by 2 wide; this can only be accommodated by supposing a strip of woodland extending north to south down the eastern border of the county. Terrett (1962) suggests that the woodland was on the lower slopes of the hills, giving way to moorland above, but on the basis of Figure 3 I doubt that there was much moorland in the county at that time. Tree remains are abundant beneath the peat cover in the Peak Disrict at altitudes up to 520 m (1700 ft) (Tallis & Switsur 1983), and there is relatively little land higher than this in Cheshire (roughly 4 km^2 in Tintwistle, and 1.5 km^2 in the Danebower–Shining Tor area). Major forest clearance in the High Peak area seems to have been first undertaken by the Viking settlers around 900–1000 A.D. (from evidence of radio-carbon dated pollen analysis), but there was evidently some reversion to woodland during early Norman times (Tallis & Switsur 1973). This would be expected from the accounts in the Domesday survey; both the Derbyshire and Cheshire volumes record the Longdendale area as all waste i.e. with no agricultural land, and no population recorded.

Some indication of the validity of multiplying the Domesday measurements to suggest

TABLE 1

Cheshire Domesday woodland, hays and eyries, recorded by Hundreds

Hundred	Woodland (km^2)	Population (per sq mile)	Hays	Eyries
Wirral	5.78	3.7	0	0
Bucklow West	21.44	1.7	7	1
Bucklow East	37.05	0.6–0.7	4	3
Broxton	39.02	1.0–3.2	5	0
Eddisbury North	25.50	2.5	8	1
Eddisbury South	35.01	0.7–3.3	0	0
Nantwich	129.08	1.0–1.8	29	8
Northwich	86.95	1.0–1.5	17	4
Macclesfield	579.93	0.4	29	7
	959.76		99	24

a nominal area of woodland is given in Longdendale; Tintwistle of Domesday is evidently co-extensive with the modern civil parish, which has an area of 47.9 km^2, while the woodland '4 leagues long and 2 wide' translates to an area of 46.6 km^2.

There is one part of Cheshire which was more wooded than the Domesday record indicates. Forests were, to the Normans, not areas of trees, but areas outside the usual laws; they were therefore not subject to the normal taxes, and do not usually get mentioned in Domesday (the New Forest in Hampshire being the exception). However, we get an indirect mention of Delamere Forest through being told that five locations were partly or entirely within the forest; these five include Kingsley, Weaverham, Conersley and two places, *Done* and *Aldredelie*, that have been lost (i.e. have no modern equivalent). Delamere Forest appears as a blank area in Eddisbury North Hundred, and we cannot tell how much woodland it included, except for the woodland mentioned under three of those five places.

Hays

The Latin *haia* (plural *haiae*) is translated generally as 'enclosure' and is evidently a rendering of the Anglo-Saxon *haeg* 'fence, enclosure' which appears in place-names as 'hay' (E.P.N.S.). (It is not to be confused with the much rarer element *heg*, 'hay' i.e. mowing grass.) Hays are only listed in Domesday for six counties, and mentioned for one other; Darby (1977, fig. 68) shows these as Cheshire (52), Shropshire (42), Hereford (10), Gloucestershire (3), Worcestershire (3) and Warwickshire (1), with several mentions of hays, but no enumeration in Lancashire. However, my listing has 100 hays in Cheshire (I have not checked the other counties), although one of these, Butley, is apparently listed twice. There are 49 places in Cheshire with hays, many of them having more than one – Adlington and Macclesfield both had 7.

What was the significance of these hays? In all cases, they are clearly related to woodland, and usually are mentioned immediately after it. In Kingsley and Weaverham, they are specifically referred to as '*haiae capreolorum*', 'hays of, or for, Roe Deer'. Morgan (1978) surprisingly translates these as 'deer parks', but *parcus* is used elsewhere in Domesday (that is, in other counties, there are none listed for Cheshire); moreover, deer parks usually held Fallow Deer, *Dama dama*, referred to in Norman Latin as dammas. The Roe Deer *Capreolus capreolus* is, especially, an animal of woodland with a good shrub layer, for cover and food (Putman, 1986), and must have been common in England in Norman times, though it was practically extinct by 1700. It seems clear, from their appearance as a taxable item, that hays represented a method of trapping

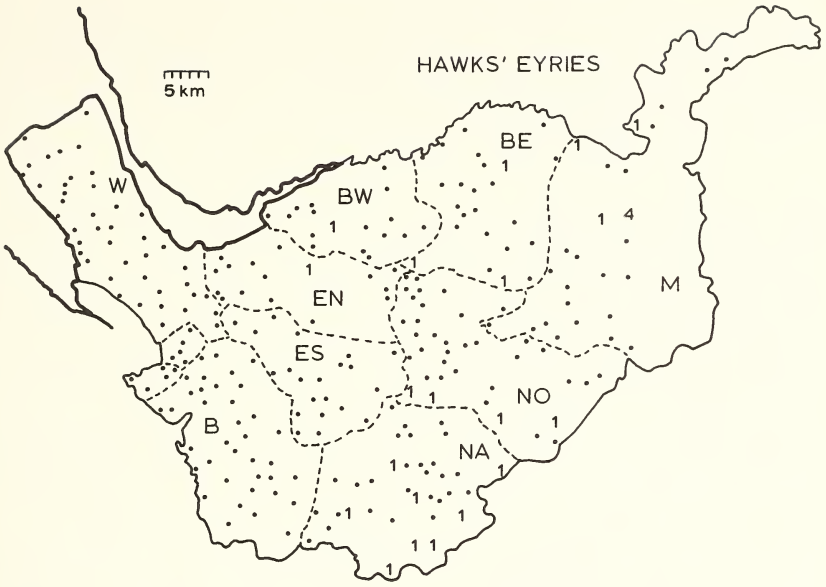

FIGURE 3
The distribution of hawks' eyries in Domesday Cheshire. The Hundreds are identified by initial letters (B, Broxton; BE, Bucklow East; BW, Bucklow West; EN, Eddisbury North; ES, Eddisbury South; M, Macclesfield; Na, Nantwich; No, Northwich; W, Wirral).

and harvesting wild animals, and the evidence of Kingsley and Weaverham strongly suggests that they were particularly intended to catch Roe Deer. Presumably Wild Boar *Sus scrofa* might also have been trapped this way, and possibly even Red Deer *Cervus elaphus*. The frequency of hays in Cheshire clearly implies that their intended victims were abundant.

A puzzling aspect of this topic is the failure of other counties to list any hays. They clearly possessed them, because the *haeg* root appears as a place-name element in other counties and, as an Anglo-Saxon term, is likely to pre-date the Domesday survey; there are 36 major place-names incorporating this root listed for Derbyshire (E.P.N.S.) yet Domesday Derbyshire lists no hays. Cheshire, with 99 hays in Domesday, has 198 major place-names with the 'hay' element, so we might, in proportion, expect at least 15 Domesday hays in Derbyshire. It seems most likely that the Domesday inquisitors on other circuits did not consider hays worthy of note, while those on the west midland circuit (Darby 1977) did; other explanations are possible however. The skill involved in making and using hays could have been limited to some parts of the country, or might even have been recently introduced by some landowners, and the Anglo-Saxon word could have been recently given this particular meaning, though this seems rather far fetched.

Hawks' Eyries

The distribution of hawks' eyries resembles that of hays, both within Cheshire and between the counties. Using Figure 70 and Appendix 10 of Darby (1977), hawks' eyries were reported for Buckinghamshire (1), Cheshire (23), Gloucestershire (2), Hereford

(1), S. Lancashire (but not detailed), Shropshire (3), Surrey (1) and Worcestershire (2), and also in NW Wales (4), listed in the Cheshire folios. My own listing has 24 in Cheshire, probably because I have counted the two entries for Minshull as two eyries, one in Church Minshull and one in Minshull Vernon. Generally, the reference in Domesday is to '*aira accipitris*' or '*airae accipitru*', though at Limpsfield, Surrey, '*nidi acciptris*', 'hawks' nests' are specified.

To us *acciptris* suggests hawks as opposed to falcons, and the listing of medieval names by Yapp (1982) suggests that this distinction was also acknowledged in medieval falconry (there are no *aira falcones* listed in Domesday, though the Peregrine Falcon *Falco peregrinus* was certainly used in falconry; e.g. Yapp 1983). However, *accipitris* was used for both Goshawk *Accipiter gentilis* and Sparrowhawk *A. nisus*. There are several reasons for feeling confident that the Domesday *accipitres* were in fact Goshawks. Yapp (1982) points out that Cheshire seems to have a fairly complete listing of hawks' eyries, and that with only 24 (he says 19) in about 260,000 ha, or 108 km^2 each, they are much too scarce to be Sparrowhawks. In modern Britain, Sparrowhawks may occur at densities up to 2 pairs/km^2, though less in Europe where predation by a reasonably thriving population of Goshawks limits their numbers (Brown, 1976). Even at 0.5 pairs of Sparrowhawks per km^2, Cheshire should have held some 1300 pairs, making them far too common to be worth noting. On the other hand, Brown (1976) suggests that a pair of Goshawks might need a hunting range of 35–50 km^2. As the recorded eyries in Domesday are confined to the eastern half of the county, the pairs of hawks in question had about 50 km^2 each; this is obviously close to the expected territory size.

A second indication that we are dealing with Goshawks comes from evidence in other counties of the render or tax payable instead of a hawk – £10 is quoted, and this was a considerable sum; the whole of Macclesfield was only valued at 20 shillings in 1086, and earlier, before 1066, at £8 (it had been waste in between these times).

A third intimation of the identity of *accipitres* comes from Hampton, which was valued in 1086 at '2 shillings and 1 sparrowhawk', with *spreuariu* being used; since the Domesday enquirers had distinguished *spreuariu* from *accipitres*, it seems reasonable to conclude that the latter were indeed Goshawks. The occurrence of Goshawk bones at Nantwich in the 13th–14th century is also confirmation (Fisher, 1986).

Finally, the coincidence of the hawk eyries with large areas of woodland itself indicates Goshawks. The average size of such associated woodlands was 1.2 km^2, with only two of them being less than 1 km^2; at Wincham, the eyrie was with '1 acre' of woodland (0.4 ha in my calculations), while at Peover the woodland was 1/2 league by 40 perches (24 ha). Perhaps more surprising are the manors with very large areas of woodland where no eyries were recorded; most notably Werneth, Tintwistle, Macclesfield, Norbury and Mobberley all had more than 2000 ha of woodland, and the last three all had hays as well. Perhaps there were too few inhabitants in these manors to locate and raid the eyries which must surely have been present.

Discussion

The three lines of evidence – the direct detailing of woodland, the hays for rounding up Roe Deer, and the Goshawk eyries – each indicate that Cheshire was quite a well-wooded county in 1086, and together make a compelling argument. On my crude method of estimating the area of woodland, Cheshire was about 36% woodland. Rackham (1986) uses a more likely calculation, i.e. that woodland in Domesday had an area of 0.7 x its length x its breadth, and he calculates that Cheshire was about 27% wooded. Applying his 0.7 correction factor to my total, I would conclude that Cheshire was 25% wooded.

Both hays and eyries were associated with larger woodlands; woodlands with neither of these average 394 ha (S.D.=764, n=77) compared with 1257 ha for woodlands with hays (S.D.=2837, n=49) and 1372 ha for woodlands with eyries (S.D.=2760, n=21). However, the ranges, and therefore standard deviations, of these measurements are large (and they are not normally distributed, so that a t-test would be invalid).

There is one other hint in the Cheshire Domesday record about the natural history

of the county. In the laws relating to the county town, there are two references to the skins of martens; the city paid in revenue £45 and 3 timbers of marten skins (a timber was a bulk quantity of 40–60 skins). Pine Martens *Martes martes* usually frequent woodland with good undercover (Velander 1983, O'Sullivan 1983), which would fit the other evidence. However, Chester was an important port, and it cannot be certain that the marten skins came from Cheshire; they could have been brought from surrounding counties, or even imported. Terrett (1962) implies that they had been imported from Ireland.

Summary

An approximate calculation of the woodland listed for Cheshire in the Domesday Book of 1086 suggests that there was a total of up to 960 km^2, mostly in the eastern half of the county. Associated with the woodlands, there are also 99 hays and 24 hawks' eyries listed. The hays were enclosures for trapping game, apparently Roe Deer, while the hawks were evidently Goshawks. Since these two species are characteristic of extensive woodland, they confirm the direct evidence that Cheshire was at that time a well-wooded county; a rough calculation suggests that it was 36% wooded, and a more refined approach indicates perhaps 25% wooded as a truer figure.

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CORRECTION

Regrettably, I overlooked an error at the proof stage in my recent paper, *Naturalist* **112**: 81–84 (1987): 'obligately' in line 17, page 81 should in fact read 'occasionally'; the use of obligately on line 14 is correct.

W. E. Rimington

BOOK REVIEWS

Coevolution and Systematics edited by **A. R. Stone** and **D. L. Hawksworth**. With a preface, a brief obituary of Alan Ramsay Stone, and a list of Systematics Association Publications. Pp. xii + 147, including graphs, diagrams and tables. Published for the Systematics Association by Clarendon Press, Oxford, 1986. £22.50.

The late Dr A. R. Stone and Dr D. L. Hawksworth have edited the Proceedings of an International Symposium sponsored by the Systematics Association to produce a book of seven essays, by specialists of differing backgrounds, concerning possible examples of co-evolution and their implications for systematics.

The book is naturally far from comprehensive but represents a series of viewpoints ranging from general dissertations to discussion of particular instances. Assumptions sometimes made by biologists concerning co-evolution are discussed: for example, Farenholz's rule ('Parasite phylogeny mirrors host phylogeny') is subject to considerable adverse criticism.

The editors refer approvingly to the rigor (*sic*) of two papers providing 'tests of parallelism' in cladograms of hosts and parasites. However, despite computational rigour attained in the production of cladograms, these (as with more intuitive assessments) provide only hypotheses regarding phylogenies; as Humphries *et al.* mention in their contribution, 'a degree of discordance' may exist between hypotheses concerning phylogenies of parasites and their hosts: not the least important reason for this is that a number of equally parsimonious phylogenetic solutions may often be produced from a given set of data.

Each essay carries an appropriate list of references. The usefulness of the book could have been enhanced by the provision of a general index.

DJH

Dinosaurs Past and Present, volume 1. Edited by **S. J. Czerkas** and **E. C. Olson**. Pp. xvi + 161, with 55 colour plates and 60 black and white illustrations, Natural History Museum of Los Angeles County and University of Washington Press, Seattle. $35.00.

A remarkable exhibition of paintings and models of dinosaurs is touring American museums. There is Waterhouse Hawkins' *Iguanodon* of about 1850, with a figure like an overweight baboon and with the spike of bone that ought to be on its thumb stuck to the tip of its nose. There are some of Charles Knight's well-loved paintings of about 1900 of dinosaurs in tranquil landscapes that recall old Dutch paintings of cattle. There are Robert Bakker's provocative pictures of around 1970, showing violently active dinosaurs. And there are also a great many newer pictures, some of them astonishing and thought-provoking: one shows a sauropod with pterosaurs perched on its back, like egrets perched on modern buffaloes; another shows horned dinosaurs with huge red and blue eye spots on their neck frills; yet another shows a brontosaur swimming, trying to shake off a pack of vicious carnosaurs.

This book consists partly of exhibits from the exhibition, beautifully reproduced. It also contains half of the papers given at a symposium held at the opening of the exhibition, to discuss the ways in which our views about the appearance and ways of life of dinosaurs have changed in the past few decades. (The rest of the papers will be in volume 2.)

In this volume, there is a fine paper by Robert Bakker summarizing his influential but controversial views, challenging previous assumptions that dinosaurs were lumbering monsters. Some of his evidence comes from fossil footprints and there is another paper devoted entirely to footprints. The rest of the papers show how artists and scientists have worked together to produce enlightening new restorations of dinosaurs.

Some of the papers are insubstantial, but the pictures make this a highly desirable book.

RMcNA

N. J. WINCH'S HERBARIUM SPECIMENS IN THE NATIONAL BOTANIC GARDENS, DUBLIN

E. CHARLES NELSON
National Botanic Gardens, Glasnevin, Dublin 9
Republic of Ireland

Introduction

Nathaniel John Winch (1768–1838) was a native of Hampton in Middlesex, but at the age of 17 became apprenticed to Robert Lisle of Newcastle upon Tyne, and he resided in the Newcastle area for the rest of his life. Winch was an enthusiastic amateur naturalist and an avid collector of shells, geological specimens and both dried and living plants; he had a garden stocked with native and European plants as evidenced by his herbarium specimens (for a brief biography see Davis & Leathart 1986).

Davis and Leathart (1986) note that Winch bequeathed his herbarium to the Linnean Society of London, and that other specimens were donated by him during his lifetime to the Literary and Philosophical Society of Newcastle; these latter are preserved in the Hancock Museum, Newcastle upon Tyne. The Winch herbarium of the Linnean Society has been almost entirely dispersed to other institutes, especially the British Museum (Natural History) and the Hancock Museum in Newcastle (see Kent & Allen 1984).

Like many other nineteenth century collectors, Nathaniel Winch exchanged herbarium specimens with fellow botanists. One of his contacts was William McNab (1780–1848), one-time (1810–1848) curator of the Botanic Garden in Edinburgh. In September 1818, McNab obtained from Winch a series of specimens which were later incorporated by McNab into his personal herbarium. In 1891 these specimens were purchased for the National Museum in Dublin, and in 1970 were transferred with other materials to the National Botanic Gardens, Glasnevin (for details of this see Nelson 1980, Nelson & McCracken 1987, Nelson in prep.).

Recently when working on other aspects of the McNab herbarium, I extracted specimens and was able to catalogue the small number of N. J. Winch specimens in Glasnevin – it is possible that others exist within the herbarium but were not detected during my search.

The Winch specimens include several British native plants which he gathered himself; for example in 1804 he collected in the Cheviots (Davis & Leathart 1986) and would then have gathered material of *Epilobium alsinifolium*. It may also be noted that he received specimens from the conchologist Dr William Turton, the original discoverer of *Draba aizoides* at Swansea (Turton's herbarium is not extant; he is not listed by Kent & Allen 1984; see Stafleu & Cowan 1986).

Winch also obtained material, probably both seeds and herbarium specimens, from Johann Christoph Schleicher (1768–1834), a Swiss botanist and collector who made a business from selling herbarium specimens (as exsiccata) to other collectors. In his own copy of a manuscript catalogue of his herbarium, Winch noted that 'The exotic division comprises 4,000 plants, partly collected in botanic gardens, partly obtained from Schleicher and Thomas of Bex'. Emanuel Thomas (1788–1859) lived in the same town as Schleicher (see Clokie 1964, Stafleu & Cowan 1985, 1986), and was a forester as well as a plant collector and vendor of exsiccata.

The most significant specimen in Glasnevin is a type specimen of *Rosa glaucophylla*, a name published by Winch – hence the annotation *mihi* (= mine) on the label. According to *Index Kewensis* this name was published in the first edition of *An essay on the geographical distribution of plants through the counties of Northumberland, Cumberland and Durham* (Winch 1819) but a label on a specimen in Winch's herbarium, Hancock Museum, Newcastle upon Tyne, reads 'Month. Mag: May 1816'. Davis and Leathart (1986) do not list any paper by Winch published in the *Monthly Magazine*,

although in that year he wrote a paper 'Brief remarks on some indigenous roses' which appeared in *Tilloch Philosophical Magazine* **47**: 243–246. The Dublin specimen is most probably an isotype.

Acknowledgements

I am grateful to Peter Davis, Hancock Museum, for his assistance and to Catherine Gorman, National Botanic Gardens, Dublin, for listing and mounting the specimens.

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Appendix: Catalogue of Specimens

All the specimens bear, in William McNab's handwriting, the annotation 'Mr. Winch Septr. 1818.', and McNab has usually repeated the plant name and source too. In the list below, the modern name is given first in italics, and then in brackets () I have transcribed the information on Winch's own handwritten label. Additional notes should be self-explanatory.

1. *Ajuga reptans* Ajuga pyramidalis / Ex Horto
   McNab added '[Ajuga] alpina??'
2. *Anemone canadensis* (Anemone dichotoma? / Ex Horto)
3. *Androsace maxima* (Androsace maxima / Switzerland Schleicher)
4. *Astrantia minor* (Astrantia minor / Ex Horto)
5. *Argyranthemum* cv. ined. (Chrysanthemum pinnatifidum / Ex Horto)
6. *Crepis* cf. *dioscoridis* (Crepis dioscoridis? / seed from Schleicher)
7. *Digitalis purpurea* (Digitalis / Ex Horto)
   McNab has added 'Digitalis with pale red flowers'
8. *Draba aizoides* (Draba aizoides / Wales. Native. Dr Turton)
9. *Epilobium anagallidifolium* (Epilobium alpinum / Norway)
10. *Epilobium alsinifolium* (Epilobium alsinifolium / Cheviet – a bad sp^{n}) Presumably from the Cheviot Hills
11. *Corydalis nobilis* (Fumaria nobilis / Ex Horto)
12. *Dicentra formosa* (Fumaria / Ex Horto)

13. *Nepeta graveolens* (Nepeta graveolens / Switzerland Schleicher)
14. *Orchis morio* (Orchis morio / near Newcastle)
15. *Polygonum* aff. *bistorta* (Polygonum / Ex Horto)
16. *Ranunculus sardous* There is no Winch label; McNab has annotated this 'Ranunculus hirsutus near New Castle. rare. Mr. Winch . . .'
17. *Ranunculus parviflorus* There is no Winch label; McNab has annotated this 'Ranunculus parviflorus Brockham Surry Mr Winch . . .'
18. *Ribes spicatum* (Ribes petraeum / Near Newcastle)
19. *Ribes lacustre* (Ribes oxyacantha? Pursh / Ex Horto)
20. *Rosa dumalis* (Rosa borreri Linn[ean Society] Tr[ansactions] / Near Newcastle) Identified as *Rosa coriifolia* by F. Crepin
21. *Rosa glaucophylla* N. J. Winch (Rosa glaucophilla mihi / near Newcastle) (see discussion above)
22. *Rosa* (Rosa involuta / Heaton Dean Nothd [Northumberland]) Identified as *Rosa* x *sabinii* by F Crepin
23. *Rosa tomentosa* (Rosa scabriuscula / Near Newcastle)
24. *Rosa pimpinellifolia* cv. (Rosa spinosissima var. cippiana / Plant from Scotland)
25. *Rosa tomentosa* (Rosa tomentosa / Near Newcastle)
26. *Rosa* cf. *pulverulenta* (Rosa / from Holland) Identified as *Rosa eglutinosa* by F. Crepin
27. *Thalictrum minus* There is no Winch label; McNab has annotated this 'Thalictrum majus Teesdale Durham Mr. Winch . . .'
28. *Vicia sativa* ssp. *cordata* (Vicia cordata / Switzerland Schleicher)

A NEW SPECIES OF SCUTTLE FLY (DIPTERA, PHORIDAE) FROM CUMBRIA

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In reporting the results of a survey of scuttle flies (Phoridae) of more than forty upland sites in Northern England, seventeen specimens of the giant genus *Megaselia* Rondani were left unidentified (Disney *et al.* 1981). The purpose of the present paper is to report one of these specimens as a new species, which is described below.

Megaselia coulsoni n. sp. (Fig. 1)

Type locality
England, Tailbridge, SE of Kirkby Stephen, Cumbria.

Type material
Holotype: ♂ Tailbridge, SE of Kirkby Stephen, Cumbria. Peatland 22 September 1976. Leg. J. C. Coulson. In coll. Disney, University Museum of Zoology, Cambridge.

Etymology
The species is named after Dr J. C. Coulson.

Description
MALE. HEAD: Frons brown and broader than high. Antial bristles closer to anterolaterals than to upper supra-antennals, and slightly lower on frons than either. Lower SA's a little shorter and less robust than uppers, which are closer together than preocellar bristles. Third antennal segment brown (including arista) and a little smaller than average. Palps dirty yellow with 7 strong, but not very long, bristles. Labrum pale brown. Labella simple with a few short spines on distal, outer margins.

THORAX: Brown, Mesopleuron bare. Scutellum with an anterior pair of short hairs and a posterior pair of bristles. Notopleuron with 3 bristles.
ABDOMEN: Tergites dark brown. Venter pale brownish grey. Only row of hairs at rear margin of tergite 6 are well developed, but even these are not long (Fig. 1). Venter with hairs on segments 3–6, those on 6 being strong ventrally. Hypopygium as Fig. 1 and largely brown, including paler anal tube.
LEGS: All brown, but yellowish brown in part. 5–6 hairs below basal half of hind femur strongly developed and clearly longer than those of antero-ventral row in distal half. The postero-dorsals of hind tibia differentiated but not conspicuous.
WINGS: Length 1.43 mm. Costal index 0.47–0.48. Costal ratios 2.65:1.65:1. Costal cilia 0.10–0.11 mm. Three bristles on axillary ridge. A minute hair at base of vein 3. Vein Sc reaches R1, even though somewhat pale near tip. All veins pale brown and membrane distinctly somewhat brownish grey.

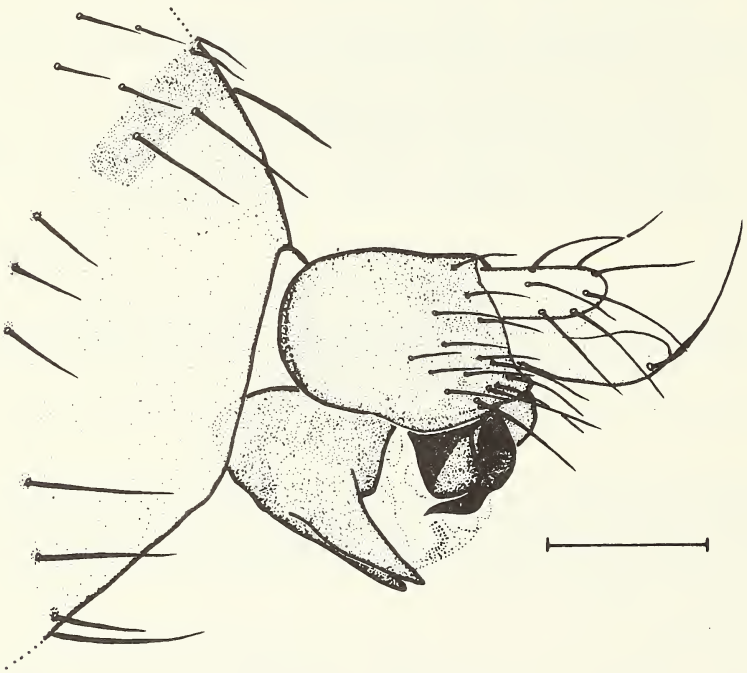

FIGURE 1
Megaselia coulsoni n. sp. hypopygium of male viewed from left side. (Scale bar = 0.1 mm)

AFFINITIES: In the keys of Lundbeck (1922), *M. coulsoni* runs to couplet 23 on page 226 if the costal cilia are regarded as 'short', or to couplet 32 if they are regarded as 'long'. It differs from *M. rubella* (Schmitz) by its brownish legs and two subequal processes from the rear of the hypandrium (cf Fig. 4 in Disney, 1983). It differs from '*M. impolluta*' (Schmitz), a synonym of *M. sylvatica* (Wood) (see Disney, 1984), by the form of the hypopygium and its simple labella, contrasting with the densely spinose labella of *M. sylvatica*. *M. coulsoni* is distinguished from all subsequently described species running to these couplets by the paired, subequal, processes of the hypandrium.

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NOTES ON THE BRITISH SPECIES OF *TEPHROCYBE* WHICH HAVE BEEN FOUND ON BURNT SITES

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Introduction

In the autumn of 1986, *Tephrocybe impexa* (Karsten) Moser was found at several sites in a small area of the R. Tees catchment. The identity of the first collection, from a year-old bonfire site in predominantly oak woodland at Gainford Spa midway between Darlington and Barnard Castle, was confirmed by P. D. Orton. In November and December four further collections were made from different bonfire sites on both banks of the Tees (VCs 65 and 66).

An attempt by the author to write the field details of these finds led to a further study of the literature on closely related European members of the genus *Tephrocybe* indicated as growing on burnt substrata. The results of this study are presented herein.

Discussion

Similarity in appearance and disagreement about habitat have led to a more than usually rich and complicated synonymy for *T. impexa* and its relatives. The names used here are those adopted by Orton in his key (1984a) and other names are introduced only when necessary. As discussion boils down to the consideration of five taxa all more or less readily distinguishable from each other by their spores, it is under the headings of spore-type, rather than names, that this discussion proceeds.

A Globose Spores

1. Spores ± smooth, globose 4.5–6 μm, according to many authors found only on burnt ground ..... *T. anthracophila* (Lasch) P. D. Orton

2. Spores with low obtuse warts giving an angular outline, globose 4.5–6 μm, not associated with burnt ground according to continental authors ..... *T. impexa* (Karsten) Moser

The fact that the spore dimensions of these two taxa are identical may be significant. Possibly *Lyophyllum sphaerosporum* Kühner-Romagnesi nom. nud. covers both these taxa: 'Sp. rondes; 4.5–6 μ, tantôt lisses, tantôt ± verruculeuses'. The *Lyophyllum (Collybia) carbonarium* of the Collins Guide with spores 'round ± prickly 4.5–5' might include both of the above but is more likely to be consistent with Watling's (1973) description of *T. anthracophila*. Lange and Hora describe *L. carbonarium* as confined to burnt places but Kuhner and Romagnesi (p.169, note 17) mention round-spored types 'voisins de sphaerosporum' growing away from burnt ground.

In preparing his key (1984a) and paper (1984b) P. D. Orton was unable to obtain the type of *T. impexa* for examination (*pers. comm.*).

3. Spores with (4) 5–6 conspicuous, projecting warts, globose 5–7 μm ..... *T. gibberosa* (J. Schaeff.) P. D. Orton

This species, the spores of which Kuhner and Romagnesi compare with those of species of *Inocybe* (sub-genus *Inocybe* [*Clypeus, Astrosporina*], presumably), is still referred to as *T. ambusta* by continental authors who give its habitat as burnt ground. Orton disagrees about habitat, giving it as 'coniferous woods in moss or leaves' and 'in moss or needles in coniferous woods (also deciduous?)' (1984a). This fungus has rarely been found in Britain but the present author has ascertained that one collection from burnt ground, in Danbury Park, Essex, is preserved in the Kew herbarium.

B Ellipsoid Spores

4. Spores minutely spinulose in water, broadly ellipsoid 6–8(9) x 5–6 μm; occurring on a wide range of substrata including burnt ground ..... *T. tesquorum* (Fr.) Moser apud Gams

This fungus has been reported in this country from decaying agarics, from deciduous and coniferous woodland, from hill pastures and amongst *Sphagnum* in addition to burnt ground (Bramley 1985; Dennis 1986). A collection by the present author from near Castleton, N. Yorks. (VC62) in October 1982 and identified by Dr R Watling as *T. plexipes* (= *T. tesquorum*), was from charred sheep dung amongst burnt *Calluna vulgaris*.

5. Spores smooth, ellipsoid 6–8 x 4–5 ..... *T. atrata* (Fr.:Fr.) Donk

This species is described as being restricted to burnt ground by all British and continental authors consulted except Rinaldi and Tyndalo (1974) who write (in the quaint English translation), 'growing in tufts in grassy places at the edge of the woods' as well as 'often on burned grounds'.

The most significant point to emerge is that there is some element of disagreement about the habitat of every one of these taxa. What are we to make of this disagreement? Ecologically, *Tephrocybe* species are not so conveniently studied as dung fungi or corticolous myxomycetes; nor is there the economic stimulus which has prompted so much current research into mycorrhizal fungi.

Nevertheless, chemo-ecological studies certainly seem relevant to problems of habitat determination in *Tephrocybe*. Hora (1959) treated coniferous litter with lime and the fungi subsequently appearing included *Myxomphalia maura*, normally associated with burnt ground. Lehmann (1976) applied urea to Scots pine litter and, among the agarics later appearing, found *T. tesquorum*. Probably the most significant work in this area is that of Sagara (1976). Work such as this certainly seems to go some way towards explaining disagreement over the habitat of the species of *Tephrocybe* under discussion. *T. tesquorum* seems to be able to make use of chemicals from burnt ground, animal waste products or the breakdown of fungal chitin. Other species, naturally colonizing burnt substrata may, when found growing elsewhere, be using traces of animal urine. It may be, too, that the converse sometimes occurs. More research is needed before the exact or sufficient nutritional requirements for fruiting of such fungi can be ascertained.

It remains possible that geographical differences in relationships to substrata also exist. This seems less likely than with, say, tree parasites or mycorrhizal fungi where geographical changes of host are related to the distribution of the host species. Mapping-schemes can only shed light on the problem with much more recording of field data.

This is certainly an area where the amateur mycologist can help the expert by routine microscopic examination of all dark grey-brown toadstools found growing on burnt ground or bonfire sites. It is quite possible to find two taxa colonizing the same small

area, so close on-site comparison of fruit-bodies is essential. Certainly this is the best way to get to know the appearance of these fungi so that they may be more easily recognized if found growing elsewhere. Records of burnt-ground collections of species with spore-types other than *T. anthracophila* and *T. atrata* are worth publishing. Material should be retained or sent to one of the national herbaria. Records from other substrata of any of the five spore-types are always worth making and material worth preserving. In such cases it is important to check the substrate as thoroughly as possible for traces of animal use or remains of decayed fungi. Care should be taken to avoid confusion with other species of *Tephrocybe* not known to be associated with burnt ground.

Finally this author suspects that the problems are not brought nearer solution by the continued use of such terms as 'carbonicolous' and 'anthracophilous' *as though* describing a necessary or 'obligate' relationship between *Tephrocybe* species and substratum. Moreover it seems that the convenient but misleading distinction between species growing on burnt ground and others not doing so will have to be dropped in the construction of any future dichotomous keys to *Tephrocybe*. It is clear that on a European scale this distinction is invalid for most of the taxa considered here and, quite possibly, for all of them.

Acknowledgements

I am indebted to Messrs A. W. Brand, M. C. Clark, P. D. Orton, Dr D. A. Reid and, particularly, Dr R. Watling for information used in this article.

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BOOK REVIEWS

The Magic of the Highlands by **W. A. Poucher**. Pp. 11 + 188 pp. of colour plates. Constable. 1987. £14.95.

Over a number of years in the 1970s the varied public lecture programme at the Natural History Museum in London included contributions by L. M. Middleton, a mountaineer with a wide interest in the natural history of upland areas. His talks were

illustrated with the outstanding photographs taken by W. A. Poucher, who being well past retirement age, was pleased for them to be used by his friend, as he felt he would no longer be doing so himself; but now, when he is well into his nineties, he has selected some of the best of his Scottish mountain photographs, written interesting explanatory notes to them, and published them in this delightful book. There are over ninety pictures, beginning with the steep cone of Ailsa Craig jutting from the sea, and ending with the much larger cone of Schiehallion, the more rounded mass of Ben Lawers, and finally a highland sunset. The sequence is in fact a tour up the west coast to beyond Stac Polly and the beautiful shore of Sandwood Bay, and back down the east coast. The photographs were taken some time ago; those few showing motor cars have a soon-after-the-war look, but of course the mountains do not change. Many of the pictures show splendid views; it is well known that Poucher was prepared to wait days for the conditions of atmosphere and light to be as he wanted. But the details of rock faces – the north peak of Ben Arthur (also known as 'The Cobbler') and its overhangs, near Arrochar, or Stob Choire in Glencoe – are evocative and beautiful too. Some of the mountains show late or early snow, but most were photographed in summer. For some reason the publishers have repeated the view of Blackmount deer forest north of Cruachan on pages 51/52 as a background for the title page, but have printed it as a mirror image. For those who know Scotland this book will bring back memories, and those who haven't been there will surely be inspired to go.

FHB

The Heart of the Valley by **Nigel Hinton**. Pp. 236. Constable. 1986. £8.95.

Most novels involving animal characters are anthropomorphic, the creatures speak and have names. This book, describing a year in the life of an English valley through the eyes of a dunnock, is different. Here only the human characters have names, the wild birds and mammals do not. There is also a pleasing lack of sentimentality, but without losing sensitivity. The fox is not labelled as evil when he kills the squirrel, nor the cuckoo for parasitizing the dunnock's nest.

As a non-naturalist Nigel Hinton has done his wildlife homework quite well. In novels we must be prepared to accept a little literary licence; for example cuckoos do not carry their eggs to the host nest in their bills.

However on the whole Hinton's history is natural rather than unnatural, and if wildlife stories are your type of reading then I think that you will probably enjoy this book.

JKS

The History of the Countryside by **Oliver Rackham**. Pp. xvi + 445, with numerous text figures, etc., plus 16 pages b/w photographic plates. Dent. 1986. £16.95.

As we have come to expect of this much respected author, this is a detailed and illuminating historical study of the British landscape. It is eminently readable and encyclopaedic in scope, containing as it does a very considerable amount of tabulated information, maps, figures and plates as well as an extensive list of references and a very detailed index and glossary. An outstanding achievement, thoroughly deserving of a wide readership.

A Guide to the Cleveland Way by **Richard Sale**. Pp. 222, including b/w photographs & maps. Constable. 1987. £7.95.

Yorkshire Dales: Limestone Country by **Tony Waltham**. Pp. 186, including b/w photographs & maps. Constable. 1987. £6.95.

The walker should have no difficulty on the Cleveland Way when following these instructions and there is a wealth of interesting description and anecdotes about places along the route. In 'The Limestone Country' there are a variety of explorations to be made on foot or by armchair, both above the ground and below in the cave system. Both guides are well illustrated and have clear sketch maps together with full OS Refs. so that route finding should present no problems.

ARC

A RE-EXAMINATION OF STAR CARR BIRDS

COLIN J. O. HARRISON

Star Carr is an important Mesolithic site in North Yorkshire. It is situated near the coast at what was once the edge of the old Lake Pickering, when it formed part of a reed-swamp fringing the lake with birch trees.

It is now dated at c. 7,500 b.p. by radiocarbon dating of the mid-silt (Middle Mesolithic culture). A summary of the site description is provided by Clark (1954), in which the faunal remains were identified by F. C. Frazer and J. E. King. The site has been discussed more recently by Potts (1979).

The mammal and bird specimens are now housed in the Mammal Osteology section of the British Museum (Natural History). Nine bird species have been identified, of which the White Stork *Ciconia ciconia* seemed the most interesting in view of its infrequent past occurrences in Britain. The bird bones were re-examined in comparison with specimens in the Bird Osteology Collection of the Museum's Subdepartment of Ornithology.

Four species appear to be invalid. The White Stork identification is based upon a portion of shaft, possibly indeterminate, but not that of a stork. The Common Buzzard *Buteo buteo* humerus appears to be that of a Brent Goose; the Pintail *Anas acuta* carpometacarpus is assigned to a Red-breasted Merganser already recognized from other bones; and the ulna assigned to a Lapwing *Vanellus vanellus* appears to be that of a Common Scoter.

The revised list of identifications is as follows:

Red-throated Diver *Gavia stellata*. Right distal humerus, left ulna.
Great Crested Grebe *Podiceps cristatus*. Left tibiotarsus.
Dabchick *Tachybaptus ruficollis*. Right ulna.
Brent Goose *Branta bernicla*. Left humerus shaft.
Red-breasted Merganser *Mergus serrator*. Right and left tibiotarsi, left carpometacarpus.
Common Scoter *Melanitta nigra*. Left ulna.
Common Crane. *Grus grus*. Right and left humeri, left and right ulnae.

I am grateful to Miss M. J. Armour-Chelu for bringing the material to my notice, Dr J. Clutton-Brock for literature references, and Mr G. S. Cowles for access to the Bird Osteology collection.

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YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1986

Compiled by DOUGLAS T. RICHARDSON

MUKER AND KELD (VC65), 31 May (F. B. Stubbs)

About 50 attended the meeting. Some groups followed the River Swale from Muker, returning by the opposite bank or via the higher ground over Kidson, while others worked entirely from Keld, again keeping to the river. Tea was held at the Kearton Restaurant in Thwaite and after tea, the President took the chair and received the day's reports.

Ornithology (G. Alderson)

The 39 species recorded during the day were predictable for the area. Many had young.

in particular Curlew and Tree Pipit. Three Wagtail species were seen and there were House Martins around Keld. Of the remaining species Common Sandpiper, Ring Ouzel, Spotted Flycatcher, Great Spotted Woodpecker and Kestrel were perhaps the most interesting, and the Cuckoo which was heard on a number of occasions during the day.

Mollusca (A. Norris)

32 species of mollusca were recorded from within 3 different 10 km squares, as follows: 19 from 35/80, 23 from 34/89 and 30 from 34/99, the most interesting being those species which have a restricted distribution either within the mountain limestone districts, or within the county generally. Some of these, such as *Clausilia dubia* are considered to be widespread and common, whilst others like *Balea perversa* and *Abida secale* have a much more restricted if not a declining distribution. *Abida secale* is considered to be one of several species for which historical evidence suggests a decline in its distribution both in Britain and in Europe. It is rare in Yorkshire for it to be found in localities below 1,000 feet, and yet in the south of England and in parts of Europe it occurs at much lower altitudes.

Entomology (R. Crossley)

The riverside upstream from Muker provided most of the entomological interest, and, in spite of less than ideal collecting conditions, Mr W. Ely and myself produced a creditable list. My own collecting was principally on the river bank where overhanging tree foliage and other vegetation was swept for flies. In all a total of 18 Empid species was recorded, of which the most notable was the northern fly *Anacrostichus verralli*, which was taken by Mr Ely at Westwood. Use of the pond net on the surface of small backwaters and moss covered boulders on the riverside produced large numbers of the Empids *Hilara bistriata* and *Wiedemannia rhyncops*. Mr Ely recorded three additional Empids at Westwood, the most notable being the scarce *Platypalpus tonsus*, and in the same locality he collected the northern crane fly *Dactylolabis transversa*. Mr Ely also recorded two northern water beetles, *Oreodytes sanmarki* in Muker Beck and *O. davisi* at Cartrake Force.

Other Arthropods (D. T. Richardson)

The meeting provided an excellent opportunity to examine 10 km squares 34(SD)89, 34(SD)99 and 35(NY)80 none of which have had much attention over the years. Our efforts were well rewarded and we reported finding four species of woodlouse, six centipedes, five millipedes and two harvestmen. Numerically this does not sound very exciting but of the woodlice *Porcellio spinicornis* and *Trichoniscus pusillus* were first for NY80. We did even better with the millipedes with *Polydesmus inconstans* Latzel 1884 as a first record for Vice-county 65 and *Brachydesmus superus* for the first time in all three 10 km squares and *Glomeris marginata* as a first for SD99 and NY80. No new finds for centipedes but the relatively uncommon *Scendyla nemorensis* was quite common high up on Kidson. Harvestmen – far too early in the year for these but we had *Megabunus diadema* as a first in NY80 and *Mitostoma chrysomelas* in SD89. Thanks to Mr Paul Lee for his help during the day.

Flowering Plants and Ferns

The majority of the botanists confined their attention to the pastures adjoining the river, the lower slopes of the fells and the roadsides and pastures between Keld and Thwaite.

The dominant plant in flower on the sides of the river was *Cochlearia officinalis*, and a surprise find in closely grazed turf was *Luzula pilosa*. In the better-drained pasture *Geranium sylvaticum* was nearly in bloom whilst in the wetter pastures between Keld and Thwaite *Caltha palustris* made a spectacular show. The roadsides were white with *Myrrhis odorata* and on the walls was an abundant growth of *Saxifraga tridactylites*. *Primula veris* in profusion on calcareous slopes and in acid flushes *Pinguicula vulgaris* approached flowering. *Adoxa moschatellina* was an attractive find near the waterfall

below Keld and on the buttress of the river bridge there was *Arabis hirsuta*. On the side of the path from the river bridge up to Keld there were several stands of *Ranunculus auricomus* and a clump of *Oxalis acetosella* with deep pink-purple flowers and in the pastures round Keld itself the dainty *Viola lutea*. Dr L. Lloyd-Evans reported *Selaginella selaginoides* and *Eleocharis acicularis* growing adjacent to one another. Ferns included *Asplenium ruta-muraria*, *A. trichomanes* and *A. viride* and *Gymnocarpium dryopteris* and *G. robertianum* growing side by side on the slopes of Kidson.

Bryophytes (C. Wall)

Gatherings were taken along the Swale valley from Muker as far as Kisdon Force, mainly on the eastern side of the river.

In meadows between Muker and the River Swale were found *Campylopus paradoxus*, *Racomitrium ericoides*, *Rhytidiadelphus triquetrus*, *Hylocomium splendens*, and the very attractive, ciliate-leaved liverwort *Ptilidium ciliare*. Species recorded on the many stone walls in this area included *Encalypta streptocarpa*, *Tortula intermedia*, *Tortella tortuosa*, and *Homalothecium sericeum*. Marshy areas adjacent to the river held *Sphagnum squarrosum*, *S. auriculatum* var. *auriculatum*, *Philonotis fontana*, *Climacium dendroides* and *Crateneuron filicinum* var. *filicinum*. The only moss found to be well established on boulders in the river was *Racomitrium aciculare*, though *Dichodontium pellucidum* and *Weissia controversa* var. *controversa* were present in small quantity in soil pockets among rocks on the river bank.

The luxuriant bryophyte flora on rocks by the flushes and rivulets entering the Swale on the eastern side included *Bryum pseudotriquetrum*, *Orthotrichum cupulatum* var. *cupulatum*, *Cratoneuron commutatum* var. *commutatum*, *Drepanocladus uncinatus*, *Brachythecium rivulare*, *Rhynchostegium riparioides* and the hepatics *Aneura pinguis*, *Diplophyllum albicans* and *Porella platyphylla*. Drier areas of rocks, often shaded by trees, held *Fissidens cristatus*, *Racomitrium heterostichum*, *R. lanuginosum*, *Pohlia wahlenbergii*, *Breutelia chrysocoma*, *Neckera crispa*, *N. complanata*, *Anomodon viticulosus*, *Isothecium myosuroides*, *Plagiothecium undulatum* and the liverworts *Barbilophozia floerkei*, *Scapania aspera*, *Plagiochila porelloides* and *Lophozia ventricosa* var. *ventricosa*.

Finally a short climb up the steep valley slopes revealed the liverworts *Barbilophozia attenuata* and *Tritomaria exsectiformis*.

Mr T. Blockeel has very kindly acted as referee.

Lichens (M. R. D. Seaward)

The region around Keld provided a highly diverse, though not outstanding, lichen flora, due to the variety of substrata and habitats. Although the epiphytic flora was of only limited interest, the mixture of calcareous and acidic stonework, in providing a rich source of records for the 10 km x 10 km mapping scheme, maintained our interest.

Recording was mainly centred upon Keld (35/8901) and Crackpot Hall (35/9000), both at an altitude of approximately 1000 feet. In all, 118 species, as well as several varieties and forms, were noted during the day, with 77 and 98 being recorded from grid squares 35/90 and 35/80 respectively. Of particular interest were twelve *Cladonia* spp., mainly from moorland habitats, and siliceous outcrops and boulders which supported, for example, *Umbilicaria polyphylla*, *Baeomyces rufus*, *Mycoblastus sanguinarius*, *Parmelia discordans*, *P. omphalodes* and the two chemical races of *Haematomma ventosum*, the presence or absence of usnic acid dictating the yellow-green or grey colour of the thallus respectively. The trees supported a low species diversity, but a high coverage of foliose forms such as *Platismatia glauca*, *Pseudevernia furfuracea* and species of *Hypogymnia* and *Parmelia*; of most interest were *Bryoria fuscescens*, *Usnea subfloridana* and *Parmeliopsis ambigua*, rare to occasional in this area, which appear to be more tolerant of acid rain than of dry deposition sulphur dioxide air pollution.

Mycology (C. S. V. Yeates)

The walk from Muker along the River Swale produced several species of interest. A

meadow held plentiful *Geranium sylvaticum* which was heavily attacked by the downy mildew *Plasmopara pusilla*. Among several rust species seen was *Phragmidium fragariae* on *Potentilla sterilis* and of great interest was Ken Payne's find of the smut *Urocystis ficariae* on *Ranunculus ficaria*.

Agarics were few but *Panaeolus ater* was found in closely rabbit-grazed grassland.

Two discomycetes on dead fern rachides were seen: *Micropodia pteridina* on *Pteridium aquilinum* and *Pezizella chrysostigma* on *Dryopteris filix-mas*, the latter near Thwaite.

Dead birch leaves produced *Gnomonia setacea* and *Venturia ditricha*. The latter has been found to be virtually universal on this substrate at a certain stage of decay.

Decaying *Juncus* stems produced two coelomycetes: *Septoriella junci* and *Stagonospora innumerosa*.

Members lunched by the river and were somewhat bemused to watch a fine 'foamcake' being sampled for aquatic hyphomycetes. Of some twenty species which were identified later the most interesting without doubt was *Gyoerffyella speciosa*. This species has beautiful 'Catherine-wheel' like conidia and I have encountered it only once before, in Breary Marsh north of Leeds.

HOW STEAN GORGE (VC64), 7 June (D. P. Savage)

That we should visit How Stean Gorge was a request by Mr Simon Warwick of the Harrogate and District Naturalists' Society and the meeting was well supported by members of that society. The weather was generally cloudy with only brief bright spells and a N–W wind kept the temperature down. Despite this the meeting was a great success and many species of flora and fauna were recorded.

Most spent the morning in the gorge, some even venturing into Tom Taylor's Cave and How Stean tunnel. After lunch some returned to the gorge whilst others took the toll road up the dale above Lofthouse, examining the limestone flora around Manchester Hole and Goyden Pot and the millstone grit moors surrounding Scar House Reservoir. Thirty sat down to tea at How Stean Cafe and after tea Dr Lloyd-Evans chaired the meeting for the presentation of reports. Thanks were expressed to the owners of the gorge, Miss Stevenson, her brother and family, both for permitting access and for the excellent tea.

Geology (D. Bramley)

How Stean is an interesting geological oddity – a small limestone exposure in a larger area of Millstone Grit. The small river has cut down through the gently eastward dipping grit and shales to expose the upper layers of the Carboniferous limestone as a gorge – probably a collapsed cavern. Near the road bridge and on either side of the river the flat surface of the massive limestone has been worn into a strange reticulated surface. When wetted the rock shows up as a death assemblage of crinoids (Sea Lilies).

Another example of an even larger crinoid stems assemblage is seen just at the entrance to the How Stean Tunnel. The stream bed showed good examples of potholes worn into the massive rock by the combined action of the water and pebbles.

Moving towards Scar House a fine exposure of fossil Brachiopods was found just below the entrance to the walled up tunnel. This exposure 7m high was packed with the largest of the productids *Giganto productus*. Further examples of this huge shell were found in boulders in the bed of the River Nidd at Manchester Hole, at the spot where the Nidd disappears into an underground passage.

At Scar House the limestone has been left behind and we are in the lower layers of the Gritstones. At the old quarry above the construction site several examples of 'ripple marked' sandstones were found. The alternate layers of sound gritstone and the easily weathered shales were very noticeable. A young member of the party found a segment of fossil tree fern – *Stigmaria* – not *Lepidodendron* as reported at the meeting.

Ornithology (Mr and Mrs S. Warwick)

Undeterred by the lack of June sun, a number of species were in full song, notably Willow Warbler, Chaffinch, Blackbird and Wren. The Gorge itself had several breeding pairs of Starling, Chaffinch and Spotted Flycatcher, whilst in the woods towards Middlesmoor, a Tawny Owl with three young was observed. The mixed woodland immediately to the west of the Gorge produced Tree Pipit and Redstart, both species being specialist breeders in the area.

In the afternoon, a number of additional species were located on the road to Scar House Reservoir, notably Great Spotted Woodpecker, Cuckoo, three displaying Curlew over the moors, Ring Ouzel singing, Black headed Gulls following a plough, Canada Geese (on the reservoir) and a solitary Heron. A large flock of c.60 House Martins with several Swifts was hawking for insects over woodland and Spotted Flycatchers were still in evidence.

It is interesting to note that in 1886, on the 63rd YNU meeting at How Stean, Redstart was noted as 'common', with Wood Warbler, Grasshopper Warbler and Pied Flycatcher all being recorded – there was no evidence of the latter three in 1986. During the day, a total of 40 species was observed (compared with 56 species in 1886).

Mollusca (A. Norris)

35 species of mollusca were recorded from two areas within the 10 km square 44/07. How Stean Gorge near Middlesmoor (44/0873 & 0973) produced a total of 27 species and the limestone cuttings and crags near Goyden Pot (44/098763) 31 species. One of the most interesting finds of the day was that of a specimen of *Discus rotundatus* which was found on the walls of Tom Taylors Cave some 50 metres in from the How Stean Gorge end of the cave. *Oxychilus draparnaudi*, a species normally associated with gardens and garden rubbish, was found under stones at the base of the limestone crags near Goyden Pot. The same locality also produced several specimens of *Vitrea subrimata*, a glacial relict species which is restricted to the high limestone areas of the Yorkshire Dales and the bordering counties.

Entomology (R. Crossley)

A good attendance by entomologists and a variety of productive habitats combined to make this a successful meeting. Diptera was the best worked order of insects and 25 species of Empids were recorded, of which the most notable were the northern *Anacrostichus verralli* (taken also the previous week at the Muker meeting), and *Rhamphomyia tibialis*. The hoverfly *Portevinia maculata*, whose larvae live in the underground portion of the leaf bases of *Allium ursinum*, was seen in woodland, and both Mr W. A. Ely and myself took the very local and scarce hoverfly *Brachyopa scutellaris* which is found on sap runs. Mr J. H. Flint recorded the handsome bee mimic hoverfly *Criorhina floccosa* and Mr Ely took the scarce northern crane flies *Dactylolabis transversa* and *D. sexmaculata*. Lots of bibionid flies (commonly known as 'St Mark's flies') were on the wing and Mr Flint recorded three species *Bibio leucopterus*, *B. marci* and *B. nigriventris*.

The rove beetle *Dianus coerulescens* was found in typical habitat (wet moss by the stream) by Messrs J. H. Flint, P. Kendall and myself, and Mr Flint also reports the soldier beetle *Podabrus alpinus* and the click beetle *Ctenicera cuprea*. Mr Ely collected the rove beetle *Quedius umbrinus* and the pollen beetle *Epuraea melina.*

Lepidoptera (Ann Mettam)

Only four species of butterfly and six moths were recorded, the adverse weather conditions and temperature having taken their toll. The most exciting find, by Mr J. H. Flint, was a colony of *Pseudopanthera macularia* (Speckled Yellow) a geometrid moth which feeds on the Wood Sage and is known in less than half a dozen places in VCs 64 and 65. *Anticlea derivata* (Streamer) was recorded by Mr Flint and *Perizoma flavofasciata* (Sandy Carpet) was flushed out of its food plant, the Rose Campion. A moth trap run

on the night previous to the meeting produced only one noctuid *Orthosia gothica* (Hebrew Character).

Other Arthropods (P. Lee)

Three woodlouse, four centipede and six millipede species were recorded from in and around How Stean Gorge, the most significant of which was a male of the small white millipede *Brachychaeteuma bagnalli*, a first for VC64. *B. bagnalli* has only been found in Yorkshire on two occasions, both records being from a garden in Easingwold (VC62) by J. Gordon Blower in 1956 and 1961. The How Stean specimen was found in association with another millipede *Brachydesmus superus* on the underside of a large stone on the very steep, wooded slope into the gorge behind the cafe where garden rubbish has been thrown on occasions. A trip along the toll road to Scar House reservoir later in the day added three more species of centipede and two more millipedes to the morning's list.

Flowering Plants and Ferns (D. R. Grant)

Lathraea squamaria was growing near the path side at the entrance to the gorge as were several lime-loving ferns viz. *Phyllitis scolopendrium*, *Cystopteris fragilis* and *Polystichum aculeatum*.

In the wet flushes were some large colonies of both *Chrysosplenium oppositifolium*, and the rarer *C. alternifolium* together with *Cardamine amara* and *Crepis paludosa*. Under the trees were *Ranunculus auricomus*, *Veronica montana* and *Myosotis sylvatica*. In the edges of the fields near the gorge *Alchemilla glabra*, *Stachys officinalis*, *Geranium sylvaticum* and *Primula vulgaris* were growing. *Montia fontana* and *Mimulus moschatus* in a marsh and a colony of *Ranunculus omiophyllus* in a muddy flush near Well Head Farm.

Bryophytes (T. L. Blockeel)

Bryophyte recording was confined to the limestone gorge and its vicinity. The following species were among those noted on the ravine walls: *Metzgeria conjugata*, *Radula complanata* (one patch only), *Lejeunea cavifolia*, *Cololejeunea rosettiana*, *Seligeria donniana*, *S. acutifolia*, *S. trifaria*, *Fissidens pusillus*, *Zygodon viridissimus*, *Anomodon viticulosus*, *Neckera crispa*, *Isothecium myurum* and *Rhynchostegiella tenella*. Confined to the moister niches were *Pedinophyllum interruptum* and *Rhynchostegiella teesdalei*.

Boulders in the bottom of the gorge were frequently bare because of the force of the water flow, but there were scattered colonies of *Schistidium alpicola* and *Orthotrichum cupulatum*. At higher levels, especially where sandy detritus had accumulated, were *Plagiomnium rostratum* (with capsules), *Hygrohypnum luridum* and *Brachythecium plumosum*.

Two of these species are of special note because their British distribution is centred upon the Carboniferous limestone of the Pennines. *Pedinophyllum interruptum* in fact is known elsewhere only from a small part of Argyll in western Scotland. At How Stean some extensive patches were seen on one part of the ravine wall. The second species, *Seligeria trifaria*, was not observed *in situ*, but was found in scrapings from the ravine wall brought home for examination. Outside the Pennines it has a few scattered localities in western and northern Britain.

Lichens (A. Henderson)

Early exploration of the southern gorgeside to the west of the café and, later, of the roadside walls and trees westward to How Stean Tunnel revealed a lichen flora diverse without surprises. At the close of the morning, however, the lichens inhabiting the gorge where the stream enters the Tunnel from the south-west (44/091734) were memorable. Here, *Belonia nidarosiensis* formed extensive sheets of dull yellow-grey (rather than the salmon-pink this species often manifests) on the deeply shaded vertical faces, stippled with bright yellow powdery patches of *Leproplaca xantholyta*. Lower down, the paving of boulders alongside the stream was covered with a dominant background of fruiting

Bacidia arnoldiana and of *Verrucaria praetermissa* with its distinctive smooth tawny-cream thallus and massed tiny perithecia.

A brief visit after lunch to the gloomy north face of the gorge below the café, partly as an act of homage to W. E. L. Wattam, who engaged in lichenology here on the YNU excursion of May 14 1938 (see *Naturalist* **63**: 233–235), yielded a visually striking saxicolous community: numerous grey-white discs of *Dermatocarpon miniatum*, sprinkled like dull coins among glaucous *Lepraria incana*. It was gratifying to stand here and echo Wattam's record of *D. miniatum* after a span of forty-nine years.

En route to Goyden Pot, a steep roadside cutting (44/099763) produced the most impressive community seen during the day, with *Peltigera praetextata*, *Leptogium lichenoides* and rosettes of *Cladonia pocillum* here and there on moss cushions or in niches of the limestone steps. *Lempholemma myriococcum*, *Scoliciosporum umbrinum* and *Placynthium nigrum* were occasional, their black thalli contrasting with the whiteness of infrequent *Solenopsora candicans*, *L. myriococcum* harbouring numerous tiny squamules of *Agonimia tristicula*, the most minuscule of squamulose lichens.

In all, 88 species were recorded during the day. This number would have been higher, had not so much time been willingly and engrossingly spent examining the three saxicolous communities noted above.

Plant Galls (J. A. Pearson)

Thirteen species of Plant Galls were seen during the day.

Cryptomyzus korschelti on *Ribes alpinum*; *Dysaphis ranunculi* and *Eriophyes goniothorax typicus* both on *Crataegus monogyna*; *Eriophyes avellanae* on *Corylus avellana*; *Eriophyes laevis inangulis* on *Alnus glutinosa*; *Eriophyes macrorhynchus aceribus* and *E. megalonyx* on *Acer pseudoplatanus*; *Eriophyes nervisequus* on *Fagus sylvatica*; *Eriophyes padus* on *Prunus padus*; *Phytomyza ilicis* on *Ilex aquifolium*; *Puccinia tumida* on *Conopodium majus*; *Urocystis voilae* on *Viola* sp. and *Uromyces ficariae* on *Ranunculus ficaria*.

POTTER BROMPTON (VC61), 21 June (B. S. Pashby)

Members met at Manor Farm on a dry but overcast morning, a north-east wind making it very cool for the time of year. Potter Brompton lies below the northern escarpment of the Wolds on the sandy alluvium of the Vale of Pickering, or 'northern sand' as it is known to East Riding naturalists. This extends to the foot of the escarpment, giving way to the chalk slopes with woodland at the higher levels, thus ensuring a good variety of habitats.

The meeting for the presentation of reports was held at Ganton C. of E. School. The President, Dr M. Seaward, was in the Chair, thirty-two people attended and sixteen affiliated societies were represented. Votes of thanks were endorsed to Mr M. H. Wrigley of Ganton Hall for permission to visit parts of the Ganton Estate and to Mr Found, Headmaster of Ganton C. of E. School for his help in organizing the meeting room.

Mammals

No formal report was given, but the following species were seen: Rabbit, Bank Vole, Wood Mouse, Brown Rat, Stoat, Weasel and Roe Deer, in addition to the widespread workings of the Mole.

Ornithology (B. S. Pashby)

33 bird species were recorded, a very good total for a cold late spring day. Swallows and House Martins were very active in and around the farm buildings while in the open arable fields were Lapwing and Yellowhammer, with Corn Bunting and Skylark displaying. The woodland held most species, Blackcap, Garden Warbler and Willow Warbler being seen or heard, Whitethroat heard calling on the edge of the wood and Redpolls displaying overhead. Also present were Great, Blue and Coal Tits; Mistle

Thrush, Song Thrush and Blackbird, the last two seen carrying food. Other finches apart from the Redpoll were Greenfinch, Chaffinch and Linnet. Although no raptors were recorded, Sparrowhawk was known to be present. I am grateful to Mr T. W. Upton for most of the records quoted.

Mollusca (A. Norris)

Seven 1 km squares were examined within the square SE44/97 and a total of 31 species recorded.

The most interesting find was a single specimen of *Candidula gigaxii*, which was located crawling on the sandy track south of Potter Brompton. *C. gigaxii* is only known from fourteen locations within Yorkshire, seven of which are on the Yorkshire Wolds, the site at Potter Brompton being an extension of the colony recorded from an old chalk pit at Willerby Wold by Walter Gyngell in 1912.

Entomology (R. Crossley)

One of the interesting features of this meeting was the comparison which could be made between the insect faunas of the sandy field edges at the base of the chalk hillside, and the chalk itself. Several species of the distinctive hairy fly *Thereva nobilitata*, identified by Mr W. A. Ely, were seen on the sandy land, flying close to the ground and resting on the track at the edge of the fields. The equally striking Asilid fly *Leptarthrus brevirostris* was taken by myself in a woodland clearing on the chalk. Mr J. H. Flint reported the sand dwelling ground beetle *Metabletus foveatus* on the field edges, and Mrs Flint found the leaf beetle *Mantura matthewsi* associated with Rockrose (*Helianthemum chamaecistus*) on the chalk. Insects with a generally south eastern distribution were to be expected and these included the cranefly *Epiphragma ocellaris* reported from Brow Plantation by Mr Ely, and my records of the Empid *Atelestus pulicarius* and the Dolichopodid *Neurigona suturalis*, both from the chalk. Mr M. L. Denton reported two specimens of the beetle *Saprinus semistriatus* in a dead mole and the rove beetle *Atheta aquatica*, which has proved to be a new record for the vice county, although known as a relatively common species. Other beetles of note recorded by Mr Denton and Mr Flint are *Amara bifrons* from chalk ploughland (J.H.F.), *Isomera murina* on hawthorn (M.L.D.), and a single specimen of *Cidnopus minutus* (M.L.D.). Mr Ely reported the mirid bug *Orthops basalis*, which was recognized as a British species in 1973, from the field edge near Manor Farm.

Lepidoptera (A. S. Ezard)

A blustery wind kept down the number of species to be found but in the shelter of hedgerows on the lower ground the micro-moths *Crambus nemorella* and *Chrysoteuchia culmella* were plentiful as were Silver-ground Carpet, *Xanthorhoe montanata* and Twin-spot Carpet, *Perizoma didymata*. In a clearing on the higher ground in the shelter of trees several Large Skippers, *Ochlodes venata* and Small Heaths, *Coenonympha pamphilus*, were flying, while under the flaking bark of a mature Sycamore was found the empty pupa case of the micro-moth *Pammene regiana*. Other early stages were larvae of Yellow-tail, *Euproctis similis* and Yellow Shell, *Camptogramma bilineata*. In all, six species of butterfly, eleven species of macro-moth and thirteen species of micro-moth were recorded.

Other Arthropods (P. Lee)

The woodland of the chalk escarpment was the richest site for other arthropods. Here the woodlouse *Haplophthalmus mengei* (a new record for the 10 km square) was common on the underside of dead wood. Also in the woodland the millipede *Ommatoiulus sabulosus* was especially abundant; both adult and immature stadia could be found under stones and fallen branches in congregations of as many as twenty individuals.

Arachnology (C. J. Smith)

Due to the low temperature, the wind and the dryness of the wood, only 21 species of spider were recorded, the only one to merit special mention being *Heliophanus flavipes* ♀, a jumping spider that is not all that common so far north.

Flowering Plants and Ferns (E. Chicken)

The varied habitats over the route taken guaranteed an interesting number of finds. At the outset *Malva neglecta* was found by the track side, with *Sedum acre* on rubble, and *Anthriscus caucalis* nearby on blown sand. This sandy area was most interesting, with *Anchusa arvensis*, *Cerastium arvense*, *Legousia hybrida* and *Viola tricolor*, and two grasses, *Aira praecox* and the uncommon *Apera interrupta*. A diversion to a small area of rough grassland on the chalk slope was most noteworthy for the dead stems of last year's *Orobanche elatior*. Rough grassland at the top of the scarp had a considerable amount of *Veronica officinalis*, and *Campanula glomerata*, *Carlina vulgaris*, *Gentianella amarella* and *Anacamptis pyramidalis* were all reported.

The extensive woodland on the scarp slope had *Moehringia trinervia*, *Orchis mascula* and *Listera ovata* on the rides in addition to an abundance of commoner plants such as *Dryopteris filix-mas*. *Sanicula europaea* was present, but *Actaea spicata*, though hoped for, was not seen. A 'clearing' – there was some discussion as to whether it had in fact ever been wooded – was noteworthy for its display of *Helianthemum nummularium*; also present here was *Viola hirta* and *Filipendula vulgaris*, some of the latter being galled. Above the wood *Fumaria parviflora* was seen.

The final stage of the route was back along the sandy area, *Lamium hybridum* being found, and at the crossing of a small water-course was much *Symphytum* x *uplandicum* with flower colour ranging from sky-blue to pink. Botanical highlights are subjective, but one member was heard to enthuse over three poppies, *Papaver rhoeas*, *P. dubium* and *P. argemone* growing within a foot or two of one another, whilst another member was delighted to see English and Dutch Elms.

Bryology (C. Wall)

The route westwards along the Wolds Way was almost devoid of mosses, only *Brachythecium albicans* being found on the dry sand. The mixed chalk woodland of Brow Plantation however produced a fine bryophyte layer with *Plagiomnium undulatum* dominating an association which included *Calliergon cuspidatum* and *Eurhynchium striatum*. *Mnium hornum*, so often a prominent member of the woodland flora was confined, along with another calcifuge *Altrichum undulatum*, to acid niches around the roots of trees. The larger clearings held typical chalk grassland species including *Dicranum bonjeanii*, *Rhytidiadelphus triquetrus* and *R. squarrosus*. *Hylocomium splendens* was seen with *Pleurozium schreberi*, possibly indicating leached areas on the escarpment. Small acrocarpous mosses seen on the hard-packed chalky soil of the woodland paths included *Dicranella schreberana*, *Barbula convoluta*, *B. unguiculata*, *Weissia microstoma* (c. fr.), *Bryum caespiticium* (c. fr.) and *Seligeria paucifolia* (c. fr.), a tiny member of the Dicranales which in Yorkshire is confined to VC61.

No less than fifteen species were found to be growing as epiphytes on old Elder and Ash trees. Among these were *Dicranum scoparium*, *Orthotrichum affine*, *Orthodontium lineare*, *Rhynchostegium murale*, *R. confertum*, *Isothecium myosuroides* and *Dicranoweisia cirrata* which was abundant. The liverworts found in this habitat included two VC61 rarities: *Ptilidium pulcherrimum* on an old Ash bole and *Frullania dilatata* on an old Sycamore in company with *Metzgeria furcata*. The only aquatic noted, *Cratoneuron filicinum*, was found in a very small stream at the foot of the escarpment.

Mr T. Blockeel has very kindly acted as referee.

Lichens (M. R. D. Seaward)

The ash woodland on the rolling Wolds, due to its immaturity, proved disappointing in terms of its lichen flora, but several mature trees surrounding the neighbouring field

proved most rewarding. *Fraxinus* and *Acer*, their barks nutrient-enriched through agricultural practices, supported a hypertrophicated lichen flora which included *Buellia punctata*, *Caloplaca holocarpa* (normally found on calcareous substrata in the British Isles), *Diploicia canescens*, *Mycoblastus sterilis* (a new vice-county record), *Physconia grisea*, *Ramalina farinacea* and *Xanthoria polycarpa*. Other occasional to rare epiphytes hereabouts were *Evernia prunastri*, *Hypocenomyce scalaris*, *Parmeliopsis ambigua* and *Usnea subfloridana* (two small thalli only).

Supplementary basic recording was undertaken, particularly since the area under study overlapped two 10 km x 10 km squares which had received little lichenological attention in the past. Churchyards at Ganton and Foxholes, in particular, proved important in this respect, furnishing records from calcareous and siliceous gravestones, walls, etc. As a result of some frenzied activity, final tallies of species recorded from grid squares 44/97 and 54/07 were 61 and 45 respectively; such modest counts are characteristic for the area and include many new and valuable records for the mapping scheme.

Mycology (C. S. V. Yeates)

A number of species of rust fungi were observed on the varied vascular plants encountered. These included *Melampsorella symphyti* on *Symphytum* x *uplandicum*, *Phragmidium sanguisorbae* on *Sanguisorba minor* and *Triphragmium filipendulae* on *Filipendula vulgaris*. The last-mentioned is a scarce species, though known from this area.

Coelomycetes of interest were *Diplosporonema delastrei* on senescent leaves of *Silene dioica* and *Septoria stellariae* on yellowing leaves of *Stellaria media*. Although neither of these species appears to have been recorded for Yorkshire before, the former has been found to be widespread and is probably quite common and the latter has since been seen near Rotherham. A considerable amount of work remains to be done on Celomoycetes in the county.

Dead patches on *Primula veris* leaves yielded the Hyphomycete *Ramularia primulae*.

Material of all the species mentioned above has been deposited at Leeds City Museum.

Plant Galls (L. Lloyd-Evans)

A respectable total of 25 plant galls was found in an under-recorded 10 km square. We benefited from the presence of a mycologist who named the six galls caused by fungi; of the rest eight were caused by gall-mites, two by aphids, four by gall-midges, four by gall-wasps and one by a sawfly.

The most conspicuous gall on chalk grassland was the woolly white ball of the gall-midge *Jaapiella veronicae* on Birdseye Speedwell. Small hard galls on Oak buds were caused by the gall-wasp *Andricus lignicola* which like the notorious Knopper has invaded Britain recently and is spreading northwards. Dropwort is a local plant in Yorkshire so it was exciting to find on it two galls, one caused by a gall-midge and the other by the rare rust fungus *Triphragmium filipendulae*. Most gall-wasps attack trees or shrubs; an exception is *Liposthenus latreillei* which causes round or oval swellings on Ground Ivy. One was found after prolonged searching; they must be much commoner in France where children are said to eat them in lieu of sweets; they are even offered as delicacies in Paris markets.

GOATHLAND (VC65) 28–29 June (M. A. Atherden)

The two-day joint meeting with the Botanical Society of the British Isles was held in blazing sunshine and was attended by over forty people. The meeting was centred on the moorland village of Goathland but members of the party spread far and wide, covering a variety of habitats, including deciduous woodland, moorland and acid peat bog. Acid sandstones and shales of the Middle Jurassic underlie higher parts of the area, but the lower ground is mostly covered by glacial drift deposits, and post-glacial peat has formed in several valleys.

Mammals, Amphibians and Reptiles

The only mammals reported were common shrew and rabbit. Frogs and toads were seen in the wetter areas and lizard and adder were both observed on the moorland.

Ornithology (Mrs S. Metcalfe)

During the morning of June 28th on Sleights Moor, the commonest species was the Meadow Pipit, frequently in song flight. Fewer Skylarks were present, again heard in song. Two Carrion Crows were seen and small numbers of Rook and Jackdaw. At noon about 30 Swifts were noted flying so high in the clear sky they were barely visible, our attention being drawn to them by the screaming of a pair at a lower level. A Kestrel was seen hovering over moorland near the main Pickering–Whitby road. A Red Grouse was heard and two Curlews seen.

In the heat of the afternoon, a quieter time for birds, an area of the Littlebeck Valley side was visited. A patch of bracken and sparse gorse scrub yielded a pair of Whinchat, obviously intent on seeing us off their territory as no doubt there was a nest and/or young present. In the farmed area, with good hedges, many hedgerow trees and larger wooded areas, and a few farm houses, the following species were recorded: Partridge, Pheasant, Woodpigeon, Swallow, Pied Wagtail, Starling, Magpie, Wren, Dunnock, Willow Warbler, Spotted Flycatcher, Robin, Blackbird, Blue Tit, Great Tit, House Sparrow, Chaffinch, Linnet, Yellowhammer. Tree Pipits were also seen by members of the party on the fringes of the village of Goathland, and both Green and Great Spotted Woodpecker were reported.

Mollusca (A. Norris)

Four 1 km squares were examined within the square NZ45/80, and a total of 21 species recorded. All the species found are common and widespread, and therefore nothing of particular note can be reported.

Entomology

DRAGONFLIES (L. Lloyd-Evans)

Three species were recorded. *Pyrrhosoma nymphula* (Large Red Damselfly); *Calopteryx virgo* (Beautiful Demoiselle) and *Cordulegaster boltonii* (Golden-Ringed Dragonfly).

Lepidoptera (Mrs J. Payne)

Eleven species of butterfly were seen during the two days. They were in very small numbers in spite of the ideal weather. It was, however, very pleasing to have ten sightings of *Boloria selene* (Small Pearl-bordered Fritillary). Nine species of Geometridae were seen: *Odezia atrata* (Chimney-sweeper) in the valleys; *Scopula floslactata* (Cream Wave) flying in the sunshine at Beck Hole; *Semiothisa clathrata* (Latticed Heath) near the railway and a newly emerged *Venusia cambrica* (Welsh Wave), a rowan feeder, was plentiful in West Beck Gorge. I have only found this moth once before in Yorkshire. The most exciting find was a group of *Eupithecia plumbeolata* (Lead-coloured Pug), flying over Cow-wheat; *E. pygmaeta* (Marsh Pug) was also found. The only member of the Hepialidae seen was *Hepialus fusconebulosa* (Map-winged Swift). *Anaplectoides prasina* (Green Arches) and *Acronicta leporina* (The Miller) were the most unusual noctuids seen, and there was an extremely large colony of *Euclidia glyphica* (Burnet Companion) in Newton Dale.

Other Arthropods (P. Lee)

Only a couple of hours could be spent in Beck Hole, during which nine species of woodlice, centipedes and millipedes were collected. Most were first for the 10 km square, the most noteworthy being the nationally uncommon centipede *Lithobius macilentus*, which was found amongst moss in the damp woodland around West Beck.

Flowering Plants (M. A. Atherden)

The recording of flowering plants was organized by Mrs N. Sykes, co-ordinator of the North York Moors Flora Project. Groups of people were assigned to specific tetrads, in which they were asked to record all flowering plants. In total, 14 tetrads were recorded, most of them in the area surrounding Goathland itself but with outlying tetrads at Runswick Bay, Robin Hood's Bay, Castleton and Mulgrave Woods. The total number of species recorded was 376, including several of particular note, such as *Coronilla varia*, *Carex spicata*, *C. dioica*, *Corydalis claviculata*, *Dipsacus fullonum* and *Gentianella amarella*. The moorland areas produced the predictable heathers and other heath species, such as *Empetrum nigrum*, *Vaccinium myrtillus*, *V. oxycoccus*, *Potentilla erecta*, *Galium saxatile*, *Blechnum spicant*, *Danthonia decumbens* and *Nardus stricta* but the boggy patches and valley mires had many wetland species of interest, such as the insectivorous *Drosera rotundifolia* and *Pinguicula vulgaris*, 25 species of sedges including *Carex acutiformis*, *C. curta*, *C. dioica*, *C. limosa* and *C. pallescens*, *Eriophorum angustifolium* and *E. vaginatum*, *Myrica gale*, *Narthecium ossifragum*, 7 species of *Juncus*, *Menyanthes trifoliata*, *Schoenus nigricans*, *Eleocharis paluistris* and *E. quinqueflora*, *Potamogeton natans* and *P. polygonifolius*.

Another group of plants well represented was that of deciduous woodland, which included *Ajuga reptans*, *Allium ursinum*, *Anemone nemorosa*, *Arum maculatum*, *Lysimachia nemorum*, *Mercurialis perennis*, *Primula vulgaris* and 45 tree and shrub species. The orchids were represented by *Dactylorhiza fuchsii*, *D. maculata* and *D. purpurella*, *Orchis mascula* and *Listera ovata*. Not only were the records of considerable interest to those attending the meeting, but they will also make a valuable contribution to the flora of the North York Moors, to be published within the next few years.

Plant Galls (L. Lloyd-Evans)

A total of 30 galls were found, caused by a wide range of agents including Bacteria (1), Fungi (5), Gall-mites (13), Aphids (2), Gall-midges (3), Diptera (1), Gall-wasps (4) and Sawfly (1). After the cold, wet spring Gall-midges were particularly hard to find, whereas Gall-mites, which prefer cool, moist conditions, were more in evidence.

The most interesting find was *Taphrina padi*, last recorded in Yorkshire by Willis Bramley in nearby Newton Dale in 1974. This fungus attacks the Bird-Cherry (*Prunus padus*), making the young fruit enlarge into hollow bags; in Germany these are called Fools' Purses, not to be confused with Pocket Plums caused by the infection of Sloes (*Prunus spinosa*) by a closely related fungus, *Taphrina pruni*. The Bird-Cherry in Wheeldale was doubly unfortunate as it had also been defoliated by the web-spinning caterpillars of the Small Ermine (*Yponomeuta padella*); possibly the attacks by one assailant weakened resistance to the other.

LOXLEY VALLEY (VC63), 5 July (T. Higginbottom)

The Loxley Valley is an important, relatively undisturbed area on the very edge of Sheffield and is perhaps the richest site in the area for mammals (bats in particular) and lower vertebrates. Geologically it belongs to the Lower Coal Measures and has woodland, sandy heaths, areas of sandy cliffs as well as a river, old mill ponds and silted-up water courses.

There are plans to make it more accessible to the public. Miss J. Blenko, the Countryside Planning Officer for the western region of Sheffield attended the meeting and several YNU members had worthwhile discussions with her regarding ecologically sensitive areas. The meeting began late on Friday evening 4 July with Messrs J. A. Newbould, T. Higginbottom and R. F. Botterill setting up three light traps near Rowell Bridge, an exercise which continued into the early hours of Saturday morning.

Saturday attracted over 40 participants and most of the day's investigations were concentrated on the Lower Loxley Valley at Acorn Hill, known locally as Little Matlock Wood. The woodland with its areas of open sandy heath proved disappointing to many

but the area beneath the sandstone cliffs as well as the old mill ponds more than compensated for this.

Contrary to normal procedure, the meeting was extended to Saturday evening when Mr D. Whiteley led a 'bat-watch' to potentially interesting sites in the valley.

Mammals and Amphibians (D. Whiteley)

Palmate newt, common frog, common toad and common shrew were seen alive while rabbit, short-tailed vole, mole and hedgehog were identified from signs or remains.

In the evening members were joined by the Sheffield Bat Group. Using Q.M.C. 'Mini' Bat Detecters several pipistrelles were observed along the course of the River Loxley and a single Daubenton's bat circled a quiet stretch of the river by the old sewage works. The highlight of the evening was a magnificent feeding display of Leisler's bats by the mercury vapour street lights at Low Bradfield. Leisler's bats are thought to be rare in Great Britain, but are probably under-recorded. They are known from 26 different localities in the Sheffield area of which Low Bradfield is the best studied. Other bats in the Loxley Valley are the Brown long-eared, whiskered and noctules.

Ornithology (P. M. Humberstone)

Just over 30 species were seen, rather a small number for an area of such diversity. Heron, Mallard, Coot, Grey Wagtail and Kingfisher were seen on the river and ponds and three Common Sandpiper on the edge of Damflask Reservoir. Wren was observed along the gritstone walls, with Skylark and Yellowhammer in the more open areas. and Greenfinch, Bullfinch and Chaffinch on the edges of the woodland. Blue, Willow and Great Tits were also seen, as well as Willow Warbler, Blackcap and Lesser Whitethroat. At one point a Sparrowhawk flew over, disturbing many of the small birds. The highlight of the day was the sighting of the Nightjar on Loxley Common, where they have bred in recent years.

Mollusca (A. Norris)

Several species of note were found within the areas, and the slugs in particular proved of interest. John Newbould reported finding *Limax cinereoniger* crawling on the path in the Loxley Valley (43/2989) and I was lucky enough to find a specimen of the subterranean species *Boettgerilla pallens* in an area of waste land near Stopes (43/2888).

The most interesting find, however, was the occurrence of *Arion flagellus*, at two sites in the Loxley Valley, 43/2888 and 43/3089. This species has only been acknowledged as a separate species in recent years, and therefore our knowledge of its distribution is limited. It does, however, seem to be associated with gardens and places in which garden waste is dumped into the countryside.

Entomology (D. Whiteley)

Most entomologists reported a mediocre day. Coleopterists made a substantial list of beetles, but nothing outstanding was recorded.

On the other hand the hoverfly group had an excellent day, recording almost 40 species in Little Matlock Wood and Rowel Bridge. An open glade in Little Matlock Wood was the best site of the day, where old woodland hoverflies *Xylota coeruleiventris*, *Chalcosyrphus nemorum* and *Criorhina berberina* were sunning on felled beech and elm logs from the previous December. Other noteworthy species were *Pipiza austriaca*, an uncommon species in Sheffield, *Sphegina clunipes*, and *Eumerus strigatus*.

These were all substantial additions to the hoverfly fauna of the Loxley Valley which has been strangely neglected since J. A. Dickinson took the remarkable *Criorhina ranunculi*, another old woodland-associated species, in 1972. The current species list has now passed the 50 mark (about 20% of the British fauna).

Lepidoptera (Mrs J. Payne)

Forty-two butterflies and moths were recorded during the day visit. Light traps had been used the previous night and almost all the moths were recorded in these.

Nine species of butterfly were seen. Most were singles or in small numbers but there was a good colony of *Maniola jurtina* (Meadow Brown) in the valley above the Rowel Bridge pumping station.

Eilema lurideola (Common Footman) was taken in the traps in larger numbers than expected for such a western location. In *The Moths of Sheffield* (1979), only three records over a period of twenty-six years are noted. *Hepialus fusconebulosa* (Map-winged Swift) was an interesting find and *Hepialus humuli* (Ghost Moth) and *H. lupulinus* (Common Swift) were also present. *Tyria jacobaeae* (Cinnabar) was seen both as imago and larvae but on the whole there were few larvae apparent, the only ones identified being *Eupithecia pulchellata* (Foxglove Pug) and *Orthosia stabilis* (Common Quaker).

Twelve species of 'micro' were named with the help of H. E. Beaumont. The most noteworthy species were the Green Oak Tortrix, *Tortrix viridana* which could be set up from almost all the oaks, and the copper and gold longhorn *Adela degeerella* which was dancing in a vertical column by the footbridge over the River Loxley.

Other Arthropods (P. Lee)

Only Acorn Hill provided anything of note, with *Trichoniscus pygmaeus*, our smallest woodlouse, under felled logs, the salmon-pink synanthropic woodlouse *Androniscus dentiger* under old building rubble tipped in the wood, and in the same rubbish Britain's smallest julid millipede *Boreoiulus tenuis*.

Flowering Plants and Ferns (D. R. Grant)

The flora of the area is typical of acid soils. Under the wooded cliffs of Acorn Hill there are several rare plants: it is the only site in VC63 for *Festuca altissima*, a very distinctive grass which grows in damp rocky woods; here too were *Polystichum setiferum* and *Gymnocarpium dryopteris*. Trees of interest included *Sorbus aria* and *Prunus avium*. On the more open grassy hillsides were several colonies of *Ulex gallii* and *Veronica officinalis*, and in two places there was evidence of basic soil conditions supporting *Sanicula europaea* and *Carex flacca*.

At Rowel Bridge, an old silted up dam has a large stand of *Lysimachia thyrsiflora*. This plant has spread over the last few years and during the excursion it was located in two new localities further downstream from the parent colony. At Malin Bridge there was a large stand of *Reynoutria japonica*, and also naturalized here was *Rosa rugosa*. Old walls had *Geranium lucidum* and *Asplenium trichomanes* growing in the black lime mortar.

At the head of the Damflask Reservoir the muddy sides support a number of interesting plants, the most notable being *Alopecurus aequalis*, *Lythrum portula*, *Littorella uniflora* and *Lysimachia nummularia*. In Low Bradfield village on a drystone wall was a colony of *Umbilicus rupestris* and at Agden Bog the rare *Scutellaria minor*.

Bryology (T. L. Blockeel)

The woodland flora was generally poor, perhaps because of the dry terrain and its close vicinity to Sheffield. One part of the millstone grit cliff under Acorn Hill which dripped water had *Thamnobryum alopecurum* at its base and *Seligeria recurvata* and *Eucladium verticillatum* in moist crevices. The *Eucladium* is usually a limestone plant and is not often seen on gritstone. Rocks by the River Loxley in the same area had *Chiloscyphus polyanthus*, *Hylocomium armoricum* and a *Jungermannia* of subgenus *Plectocolea* which did not have inflorescences mature enough for identification. A brief visit was made to the Damflask Reservoir but the season was too early for the rich ephemeral flora of the reservoir margin. *Fontinalis squamosa* and *Hygrohypnum ochraceum* were seen in the inflow stream and *Campylopus introflexus* with fruit on bare ground nearby.

Mycology (C. S. V. Yeates)

Dry conditions prevailed at this meeting, with the result that very few larger fungi were encountered, but, as is generally the case, careful searching produced some interesting micro-fungi.

Several members noted the quantity of the basidiomycete *Exobasidium vaccinii* galling *Vaccinium myrtillus* on open slopes, south of the River Loxley. Also near here was found the *Dilophospora alopecuri* state of *Lidophia graminis* which causes the disease known as 'Twist', in this case on *Holcus lanatus*. This coelomycete produces highly distinctive conidia with branched processes at each end.

Three species of *Leptosphaeria* were observed during the day: *L. typharum* was on *Typha latifolia* near Stopes, *L. graminis* was on *Phalaris arundinacea* at the north-western tip of the Damflask Reservoir and *L. nardi* was on *Nardus stricta* at Agden Bog. This last mentioned appears to be the second Yorkshire record.

Plant Galls (J. Pearson)

Although thirty-two galls were recorded during the day, many more would have been expected from this most interesting site. No doubt the very poor weather, cold, wet and windy, that had been experienced during the Spring and early Summer was reflected in this rather poor record.

There are many oaks in the valley and yet only seven oak galls were recorded. *Cynips divisa*, usually a fairly common leaf gall, was found on only one tree. *Cynips quercus-folii* was abundant in the valley in 1985, this year I failed to find a single gall.

The three most interesting galls were all caused by fungi. They were *Frankia alni* and *Taphrina tosquinetii* on *Alnus glutinosa*. and *Exobasidium vaccinii* on *Vaccinium myrtillus*.

SUNK ISLAND (VC61), 17 August (B. S. Pashby)

This second one-day excursion in VC61 was held as an alternative to a week-end meeting earlier in the season, an August date being chosen in order to judge possible support for a late date.

On one of the few fine sunny days of the summer, thirty-five people met at Sunk Island Church in the morning and made their way to the Sunk Island shore by way of the private track from The Old Hall to the guard bank, by kind permission of the farmer, Mr G. R. Dixon. The fine old stand of Elms at The Old Hall had eventually succumbed to Dutch Elm disease despite valiant efforts by Mr Dixon to prevent this.

Sunk Island is a large area of land reclaimed from the Humber and is very intensively farmed. However, in addition to the narrow strip of saltmarsh, there are interesting pockets here and there, chiefly the banks of the dykes and the mud flats. In the afternoon, Fisherman's Channel was visited. This is a strip of water which marks the southern boundary of one reclamation and the northern boundary of a later one and was, at one time, the only means of access to the isolated farmsteads in that area. However, it now remains as a useful drainage channel.

The meeting for the presentation of reports was held in the Church Hall, Patrington, at the kind invitation of the South Holderness Countryside Society who generously provided us with welcome tea and biscuits. Mr J. H. Flint was in the Chair, twenty-four people attended and eighteen Societies were represented. Votes of thanks were extended to Mr G. R. Dixon of The Old Hall and Mr Abell of Channel Farm for their help and to Mr A. Burnham and the South Holderness Society for their hospitality and assistance during the day. It was felt that in view of the good attendance and the long distance some members had had to travel, the meeting had indeed been worthwhile. Mr Flint proposed a vote of thanks to Mr and Mrs Pashby for organizing two very successful meetings this year, Mr W. A. Ely also expressing his appreciation.

Mammals and Other Vertebrates

No formal report was given but the following species were mentioned: Brown Hare, seen on the arable fields; the Common Lizard, and the track of what was probably Roe Deer was clearly marked in the mud of a small drain feeding Fisherman's Channel.

Ornithology (W. F. Curtis)

Sunk Island shore, visited in the morning at low tide, offered a rather limited habitat of intensive arable cultivation with very few bushes or trees and a narrow strip of saltmarsh. During the period before lunch, 44 species were reported, including ten waders, these being found mainly towards the large expanse of tidal mud to the east. Amongst these, Greenshank was probably the highlight with Grey Plover and Whimbrel also pleasant sights. Light westerly migration of Swallows was taking place throughout the period with a single female Sparrowhawk being flushed from near Hawkin's Point. Passerines in general were few though small numbers of Meadow Pipits and Skylarks were in evidence. Blackbird, Song Thrush, four species of warblers plus Collared Dove were seen in the vicinity of the bushes near the parking area. Several members gave up the visit to Fisherman's Channel to remain at the shore for the incoming tide, adding a further sixteen species to those already reported during the morning session, the more interesting being Fulmar, a male Goosander and Black-tailed Godwit.

Fisherman's Channel contained much uniform vegetation, some small areas of mud and a water level well down on a visit some weeks previous. 33 species were recorded: eight of waders, including Greenshank, Green Sandpiper, Ruff and Spotted Redshank, four of ducks, including Shoveler, and all three wagtails, the occurrence of Grey Wagtail in this locality being very unusual during the summer months. A total of 71 species was recorded during the day.

Mollusca (A. Norris)

Although only eight species of mollusca were found, one of these, *Hydrobia* (*Hydrobia*) *ventrosa*, was of particular interest, in that it is only found, in Yorkshire, in the brackish water habitats situated just behind the guard bank of the Humber, at Sunk Island. In this restricted habitat, however, it can usually be found in great abundance.

Entomology (J. H. Flint)

With a few exceptions, insects were rather sparse in the narrow band of saltmarsh between the Humber bank and the foreshore but those taken included a number of typical coastal and estuarine beetles, *Bembidion varium* Ol., *Amara convexiuscula* Marsh., *Dicheirotrichus gustavi* Crotch, *Omalium riparium* Thoms. and *Staphylinus ater* Gr. Plant-feeding beetles were almost totally absent but the patches of *Artemisia maritima* had a strong population of the delicate, whitish-looking plant lice *Craspedolepta malachita* Dahl. which has not previously been reported in Yorkshire. Only three localities for this are listed for Britain in the 'Handbook'. Smaller numbers of the plant bug *Plagiognathus albipennis* Fall. were found on the same plant and specimens of the hopper *Paramesus obtusifrons* Stal were swept from *Scirpus maritimus*. *Paramesus* has only been found previously in the county just a little further up the estuary at Cherry Cobb Sands, which is at the northern limit of its known range in Britain. Other beetles of more general distribution were found among which *Bembidion properans* Steph., *B. aeneum* Germ., *Oxypoda annularis* Mann., and *Philonthus rectangulus* Sharp are worth noting.

In Fisherman's Channel interest centred on the exposed, brackish mud and detritus of the Channel bed and typical insects of estuarine conditions seen here were the ground beetles *Bembidion assimile* Gyll., *B. fumigatum* Duft. and *B. varium* Ol. and the shore bugs *Salda littoralis* L. and *Saldula pilosella* Thoms. Other insects seen were quite common forms and only the rather local hoverfly *Eristalinus sepulchralis* L. and the horse-fly *Chrysops relictus* Mg., whose larvae were probably living in the stagnant water, are worth a mention.

I am indebted to Mr M. L. Denton for a list of beetles seen; all those included above are among those noted by him.

Lepidoptera (Mrs J. Payne)

The butterflies were concentrated mainly on the flowers on the sloping sides of the holding dyke behind the Humber guard bank. For such a highly cultivated area the numbers were high, thirteen species being recorded. *Maniola jurtina* (Meadow Brown), *Aphantopus hyperantus* (Ringlet), and *Pyronia tithonus* (Gatekeeper) were well worn but *Lasiommata megera* (Wall) was freshly emerged. *Pyronia tithonus* (Gatekeeper) was plentiful, which is very pleasing as it was not recorded on the Biological Records Centre Distribution Maps of 1981 for 10 km square TA21. *Pieris rapae* and *P. napi* (Small and Green-veined Whites) were common but *P. brassicae* (Large White) was only in small numbers. *Aglais urticae* (Small Tortoiseshell), *Inachis io* (Peacock), *Vanessa atalanta* (Red Admiral), *Cynthia cardui* (Painted Lady), *Lycaena phlaeas* (Small Copper) and *Thymelicus sylvestris* (Small Skipper) were also seen.

The only moths recorded as imagines were *Camptogramma bilineata* (Yellow Shell), *Eupithecia expallidata* (Bleached Pug), *Euproctis similis* (Yellow-Tail), *Plusia gamma* (Silver Y) and *Luperina testacea* (Flounced Rustic). Larvae were extremely scarce but *Cucullia asteris* (Star-wort) feeding on *Aster tripolium* (Sea Aster) had only previously been recorded in the two 10 km squares east of Sunk Island. *Pheosia tremula* (Swallow Prominent) on *Populus* sp (Poplar) was also a new record for 10 km square TA21.

Flowering Plants and Ferns (D. R. Grant)

The flora of the muddy banks of the Humber is a typical maritime one with a few dominant species, viz. *Puccinellia maritima*, *Aster tripolium*, *Scirpus maritimus*, *Triglochin maritima* and *Elymus pychnanthus*. Noteworthy species were *Artemisia maritima*, *Apium graveolens* and *Hordeum secalinum*. The dry part of the dyke banks had the rare *Sison amomum* with *Festuca arundinacea*, a fair quantity of *Picris echioides*, and an abundance of *Dipsacus fullonum*. By the side of the track *Solanum nigrum* was a weed of cultivation.

At Fisherman's Channel, the dominant species were again *Elymus pycnanthus* and *Scirpus maritimus*. Along the track were *Puccinellia distans* and *Ranunculus sardous*, together with *Coronopus squamatus*. At the edge of the cornfield, *Alopecurus myosuroides* occurred as isolated colonies, and at the top end of the Channel there was a small colony of *Phragmites australis*.

At Winestead Drain near Havenside, Patrington, *Potamogeton pectinatus* was growing in the water with *Myriophyllum spicatum* and *Lemna minor*. The ditch sides had *Sparganium erectum*, *Mentha aquatica* and *Carex otrubae*. Throughout the day there was much evidence of chemical weedkilling and very few plants were seen in the very extensive cornfields which cover this region of East Yorkshire.

Mycology (C. S. V. Yeates)

The very dry conditions which prevailed around the time of this meeting resulted in there being very little of interest mycologically. In addition, the tidal mud coating the lower portions of the creek side plants at Fisherman's Channel made searching for micro-fungi on dead stems virtually impossible.

The only agaric seen in the field was *Panaeolus semiovatus* on horse dung on the Humber shore but *Coprinus stercorarius* appeared on rabbit droppings from the same locality which were incubated in moist petri dishes. Among other species which appeared on the rabbit dung was the discomycete *Iodophanus carneus*.

Among the plant parasites seen were the downy mildew *Peronospora lepigonii* on both *Spergularia marina* and *S. media*, the powdery mildew *Sphaerotheca plantaginis* on *Plantago maritima* and the rust *Puccinia tanaceti* on *Artemisia maritima*. Although the last mentioned has not been recorded from Yorkshire before, I have now several reports of it across the county and on four different host species.

Plant Galls (L. Lloyd-Evans)

Seven kinds of gall were recorded. The most interesting was a leaf-roll caused by the aphid *Hayhurstia atriplicis* on *Atriplex littoralis*; the aphid is common on other species of orache but this host has a very limited range in Yorkshire. More colourful galls were the purple blotches of the gall-midge *Cystiphora sonchi* on *Sonchus arvensis* and the gold spots of the fungus *Taphrina populina* on *Populus* x *canadensis*.

BOOK REVIEWS

Riches of the Wild: Land Mammals of South-East Asia by the **Earl of Cranbrook**. Pp. 95. Oxford University Press, Singapore. 1987. £6.95.

This curious little book, one of a series called 'Images of Asia', packs within it a surprising amount of information on the land mammals of Asia from southern China to northern Australasia. It includes a checklist of 660 species and their distributions on the mainland and many islands of the region, with ecological notes on habitat and species. The species include bandicoots, cuscus, sugar gliders, tree shrews, shrews, gymnures, moles, colugos, bats, primates, jackals, dholes, bears, mustelids, viverrids, mongooses, cats, elephants, tapirs, rhinos, pigs, mouse-deer, deer, bovids, pangolins, hares, and rodents galore. Many are illustrated by coloured and black and white photographs, and paintings by A. M. Hughs. There is a short selected bibliography but no index.

BS

Sharks by **J. D. Stevens** (consulting editor). Pp. 240. Merehurst Press, 1987. £16.95.

Described as 'An illustrated encyclopaedic survey by international experts', this is a compilation from 17 widely-scattered authors, organized by a production team presumably in Australia, produced and printed in Hong Kong. Amazingly, the recipe is successful; this is a superb book. It falls into three sections. The first covers shark biology (evolution, sensory equipment, breeding, distribution etc.). The second covers patterns of shark attack in Australia, the US, South Africa, New Zealand and the tropical Pacific Ocean. The third deals with sharks in myth and reality, including photographers' experiences in shark cages and shark repellents. Not a bed-time book – too many gory pictures and stories – but a fascinating one nevertheless, written for everyone from expert to layman with excellent illustrations. It would be interesting to know the sharks' point of view; far more sharks are killed by people each year than people are killed by sharks.

BS

Save the Birds by **A. W. Diamond, R. L. Schreiber, D. Attenburgh,** and **I. Prestt**. Pp. 384. Cambridge University Press. 1987. £17.50.

'This unique book,' says the blurb, 'spearheads an international campaign for the conservation of the world's threatened birdlife – Save the Birds World Campaign 1987.' Neither the sentiment nor the book can be faulted. This is an international project, conceived by Pro Natur in Germany, implemented in close association with the International Council for Bird Preservation, under the principal authorship of ornithologist Tony Diamond, and published in the UK by CUP. Yet another campaign to save the birds? Ballyhoo apart, this is a well-written, clear book for bird enthusiasts; it might be right for the younger generation, but seems to be aimed more at the already-convinced. It is packed with colour and ecological information, and good value at the price.

BS

Auks. An Ornithologist's Guide by **Ron Freethy**. Pp. 208, with colour and black and white photographs and line drawings. Blandford. 1987. £14.95.

The Auk family, consisting of only 22 species, provides an excellent subject for a book, as each species can be covered in some detail without the size of the book or its price becoming too large.

A logical layout proceeds from classification of the Auks to their biology and ecology, finally dealing with each species individually.

The distribution maps for each species, although reasonably clear, could have been improved by making them larger, perhaps by omitting all of the Southern hemisphere (Auks are only found in the Northern hemisphere), and by using more obvious shading or colour.

The Atlantic Auks are given much more attention than their Pacific relations, presumably reflecting present state of knowledge rather than the author's prejudice. Hopefully, this book may encourage more work to be carried out on the under-studied species. The line drawings by Carole Pugh are very good and the publishers should be congratulated on the overall excellent quality of the publication; the reproduction of the colour prints cannot be faulted. A book for every ornithologist's library.

JEK

John Ray: Naturalist. Pp. xxvi + 506. Cambridge University Press. 1986 (reprint of 1950 edition, with additional introductory matter). £15.00 paperback.

A moderately priced reissue of the classic biographical work on the Father of English natural history, John Ray (1627–1705), with the addition of a 5-page introduction by S. M. Walters. Recommended not only to historians of natural history, but to all those naturalists interested in the British, and indeed world, origins of their subject.

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Atherden, M. A., 150, 152

Baker, R. A., 53–58
Beaumont, H. E., 14, 78–79
Blockeel, T. L., 23–24, 146, 154
Boyd, M. J., 9–14
Bramley, D., 144
Brightman, F. H., 30, 139–140
Brown, D. H., 28

Caverhill, A. R., 28, 140
Caverhill, D. A., 34, 79
Chicken, E., 27–28, 149
Clark, M. C., 65–66
Clegg, T. M., 18
Collingwood, C. A., 95–101
Crackles, F. E., 25
Crossley, R., 142, 145, 148
Curtis, W. F., 156
Cutts, D. B., 9–14

Davies, B. E., 80
Davis, P., 85–93, 94
Densley, M., 77
Disney, R. H. L., 135–137

Ely, W. A., 31–33
Ezard, A. S., 148

Flint, H. E., 107–109
Flint, J. H., 7, 22, 107–109, 156–157
Fryer, G., 3–7

Galloway, D. J., 30
Gilpin, A., 29, 113
Gramshaw, A., 65–66
Grant, D. R., 25–26, 146, 154, 157

Hale, W. H. G., 79, 101–102
Hambler, D. J., 106, 132
Harrison, C. J. O., 141
Henderson, A., 15–17, 146–147
Hering, T. F., 33–34, 114–115
Higginbottom, T., 152–153
Hinton, V. A., 94
Howes, C. A., 9–14, 21–22
Hughes, J., 95–101
Humberstone, P. M., 153

Jones, D., 59–65

Knight, J. E., 124, 159

Lee, P., 146, 148, 151, 154
Legg, A. W., 137–139
Limbert, M., 117–124
Lloyd-Evans, L., 150, 151, 152, 157
Luxton, M., 67–77

Magee, L., 26–27
Mather, J. R., 35
Medd, T. F., 25, 27
Metcalfe, S., 151
Mettam, A., 145–146

Nelson, E. C., 133–135
Norris, A., 103–106, 142, 145, 148, 151, 153, 156

Pashby, B. S., 147, 155
Payne, J., 151, 154, 157
Pearson, J.A., 147, 155
Preece, T. F., 65–66
Purvis, O. W., 80

Read, H. J., 19–21
Richardson, D. H. S., 58
Richardson, D. T., 36, 142
Rimington, W. E., 81–84, 131

Savage, D. P., 144
Seaward, M. R. D., 37–52, 79–80, 84, 102, 112, 115, 143, 149–150
Skidmore, P., 8
Smith, C. J., 149
Smith, D. H., 35
Smith, J. K., 22, 24, 34–35, 93, 94, 116, 140
Stewart, P. R., 15–17
Stonehouse, B., 158
Stubbs, F. B., 141

Thayre, M. E., 66, 116

Wall, C., 143, 149
Wardhaugh, A. A., 78
Warwick, S., 145
Wheater, C. P., 19–21
Whiteley, D., 152

Yalden, D. W., 125–131
Yeates, C. S. V., 143–144, 150, 155, 157

INDEX

Archaeology
Star Carr birds, 141

Biography
William Backhouse: entomologist, ornithologist and horticulturalist, 85–93

Book Reviews
7–8, 14, 18, 21–22, 24, 28, 30, 34–36, 58, 66, 77–80, 84, 93–94, 101–102, 106, 112, 115–116, 124, 132, 139–140, 158–159

Botany
Botanical report for 1985, 25–28; Botanical investigation on Thorne Moors, 117–124; N. J. Winch's herbarium, National Botanic Garden, Dublin, 133–135

Bryology
Anomodon longifolius in the north of England, 23–24

Echinoderms
Asterias rubens on an intertidal mussel bed in Morecambe Bay, 59–65

Entomology
Chironomid midges from North York Moors, 17–18; Evanoidea of Yorkshire, 31–33; Ant species in Yorkshire, 95–101; Entomological reports for 1979–1986, Hymenoptera: Symphyta, 107–109; Aculeate Hymenoptera in Yorkshire, 109–112; A new species of scuttle fly from Cumbria, 135–137

Lepidoptera
Swallowtail butterfly in Yorkshire, 81–84

Lichenology
300 years of Yorkshire lichenology, 37–52

Mammals
Minke Whale in the Humber and Yorkshire waters, 9–14

Millipedes
Habitat relationships of millipedes from Cheshire, 19–21

Mites
Unionicola ypsilophora, a freshwater mite in the Swan Mussel, 53–58; Oribatid mites from the Isle of Man, 67–77

Mollusca
The genus *Testacella* in Yorkshire, 103–106

Mycology
Fungi from Shibden Valley clay mine, 15–17; Fungus forays in 1985, 33–34; *Verpa conica* in two new Yorkshire vice-counties, 65–66; Fungus forays in 1986, 114–115; British species of *Tephrocybe* from burnt sites, 137–139

Natural History
Natural history of Domesday Cheshire, 125–131

Ornithology
Former breeding of Golden Eagle in Yorkshire, 3–7; Red-legged Partridge, 29; Little Owl, 113; Star Carr birds, 141

Yorkshire Naturalists' Union
Excursions in 1986, 141–158

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Changes in grasshopper distribution and abundance at sites in the north Merseyside sand dunes — *David Atkinson and Michael Begon*

Hatfield Chase: the loss of drainage channel habitat — *M. Wingfield and P. M. Wade*

The Aculeate wasps and bees (Hymenoptera: Aculeata) of my local patch: Strensall Common, the first 70 visits — *M. E. Archer*

Occurrence of the Stonewort, *Nitella mucronata var. gracillima*, new to northern Britain, at Copley, near Halifax — *A. Henderson and P. R. Stewart*

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Photographic Plates

Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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CHANGES IN GRASSHOPPER DISTRIBUTION AND ABUNDANCE AT SITES IN THE NORTH MERSEYSIDE SAND DUNES

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Introduction

The species in this study, the Common Field grasshopper *Chorthippus brunneus* (Thunb.) and the Mottled grasshopper *Myrmeleotettix maculatus* (Thunb.), are near to their northern limit in the north of England, where they are the commonest species of dry grasslands containing considerable amounts of bare ground. They often occur together, as in the present study, on sand dunes and in quarries (Ragge 1965). Yet despite their commonness, changes in their abundance and distribution have not been compared on sites where they co-occur, except by Richards and Waloff (1954) at Silwood Park in Berkshire where *M. maculatus* was poorly represented.

Vegetational structure is generally considered an important determinant of grasshopper distribution (Vestal 1913, Clark 1948. Dempster 1955, Lensink 1963, Uvarov 1977, Sanger 1977, Joern 1982), and warm sunny weather normally enhances fecundity and rates of development and survival (Richards & Waloff 1954, Dempster 1963, Begon 1983). The present study brings together these effects by examining, at Ainsdale Sand Dunes NNR, Merseyside, the influence of vegetational structure and microclimate on grasshopper abundance, distribution, mortality, and rates of development in a cool wet and a warm dry year. However, our study also suggests how these effects are influenced by the following differences in life history between the species.

C. brunneus is the larger species, whose adults are about twice as heavy as those of *M. maculatus*, and which typically lay more than twice as many eggs per egg-pod (Richards & Waloff 1954, Atkinson & Begon 1987a. 1988). At Ainsdale, however, *C. brunneus* tends to produce smaller eggs (Atkinson & Begon 1987a).

General methods

The three sites were between 0.88 km and 1.23 km apart. At one site in the open dunes (site 1; see below) two rectangular enclosures were constructed, each 10 m × 8 m with a 1 m high wall of polythene sheeting which appeared to prevent migration of all nymphs and adults, except for a small number of adult *C. brunneus*.

Grasshopper Sampling

The numbers of grasshoppers of each instar in each species were counted in usually not less than thirty 1 m^2 units at each site on sixteen successive occasions in 1981, and on twenty-one occasions, with two supplementary visits to site 3, in 1982 (details in Appendix). Each site was split into three to five sections along the major habitat gradient (slope or vegetation structure) and each section was sampled randomly and with the same intensity, using a map and randomly-chosen co-ordinates. Each quadrat was approached facing the sun to avoid casting a shadow over the grasshoppers, and a 1 m^2 box-quadrat covered with fine nylon netting funnel was quickly placed over the sample square. In 1982, sampling from the enclosures ceased on June 2 because the densities within them were then altered for another experiment. After observing the movement of late-instar nymphs and adults, mainly of *C. brunneus*, out of site 1 in 1981, the site was extended in 1982 to include more of the surrounding dense vegetation. This extension reduced the amount of migration from the site and thereby improved the analysis of grasshopper survival rates.

Amounts of Grass and Bare Sand

Differences in vegetational abundance observed between sites in 1981 and 1982 were

described mainly subjectively (see section on vegetation types, and Atkinson (1985)), but were consistent with results of the following more quantitative measures made in June 1983. The abundance of each grass species at each site was estimated using the point-intercept method (Mueller-Dombois & Ellenberg 1974). A pin was lowered at 100 randomly-chosen locations at each site (and 50 in each enclosure), and the abundance of each grass species was estimated as the number of times the pin touched leaves of each species. To obtain total grass abundance, these measurements were summed for all grass species except the inedible marram grass (*Ammophila arenaria* Link). The amount of bare sand was estimated from the number of locations at which no vegetation was touched by the pin.

Vegetation Types and Aspect
As the grasshopper populations were being sampled between April and October 1982 (see above), the structure of the vegetation was described in all of the 1 m^2 quadrats. The vegetation in each quadrat was assigned to one of six 'vegetation types' described by Lensink (1963) which ranged from very sparse (type I) to dense tall grass (type VI). The aspect (compass direction) of each sloping quadrat was also measured.

Evaporative Water Loss
Daily rates of water loss were measured on ten occasions in May and June 1983 from evaporation tanks positioned randomly on the ground at each site and in each enclosure 78, 65 and 79 measurements were taken at sites 1, 2, and 3, respectively, and 35 and 32 in enclosures 1 and 2.

Grass Nitrogen Content
This account gives only the salient points from a more detailed description of methodology in Atkinson and Begon (1988). Samples of species forming more than 15% of the total grass at a site were collected on four occasions approximately monthly between 2 June and 30 August 1982. In addition to these species (*Festuca rubra* L., *Agrostis capillaris* L., and *Holcus lanatus* L., depending on site) supplementary samples of *A. capillaris* from site 3, and of *H. lanatus* from sites 1 and 2, were also collected. The estimated mean nitrogen-content of a grass blade randomly chosen was compared between sites: a grand mean was calculated for each site using the mean nitrogen-content of each species collected, weighted by its relative abundance. This estimate therefore places appropriate weight on the most common species, but ignores some of the rarer grasses which were not sampled.

Temperature Differences
Each of the sites had a wide range of vegetation types, slopes and aspects into which grasshoppers could move to regulate body temperatures (Fig. 1; Atkinson 1985). However, the enclosures restricted grasshopper movement, and may also have influenced the microclimate. Temperature differences between each of the enclosures at site 1 and the outside site were therefore measured. During one week of variable weather conditions in mid-August 1983, and during the following week, exponential mean temperatures were measured using a total of 119 tubes containing buffeted sucrose solution (Berthet 1960). The tubes were covered with aluminium foil and were attached, one at ground level and one at 10 cm above the ground, to canes located randomly in each enclosure and in the surrounding site.

Differences in grasshopper mortality and developmental rates between the two years were also related to the differences in maximum daily temperature recorded at Ainsdale Sand Dunes NNR meteorological station.

Site Descriptions

Site 1 was situated in open dunes, was more exposed than the other sites, and had a greater area of sparse vegetation (Fig. 1) and bare sand (Table 1). Presumably as a

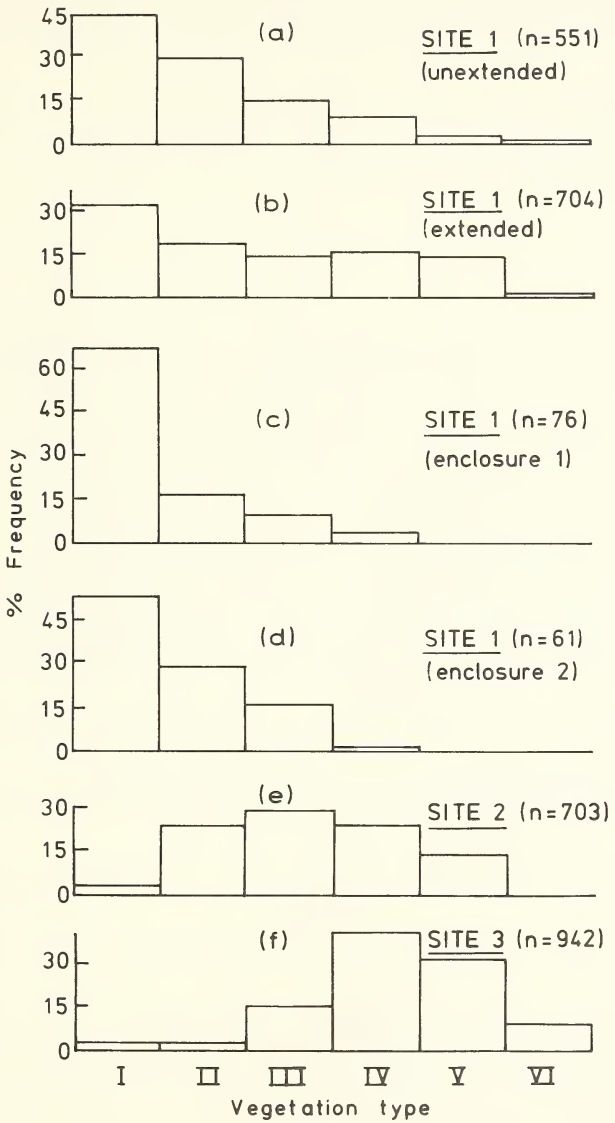

FIGURE 1
Frequency of vegetation types in each site and enclosure, 1982. Vegetation types range from sparse (I) to tall dense (VI), after Lensink (1963)

TABLE 1

Estimated abundance of grass, grass with thin-edged leaves, and bare sand; and mean nitrogen-content of grass blades. All percentages are based on 100 samples for each site (50 for each enclosure) except nitrogen-levels, where numbers are indicated.

Site (enclosure)	1	1(1)	1(2)	2	3
Grass; no. of touches	14	16	10	30	37
Grass with thin-edged leaves; no. of touches	4	6	<1	25	14
% bare sand	26	28	22	1	2
% nitrogen content: mean ± 95 Cl	1.53±0.13	1.73±0.19	1.60±0.20	1.52±0.22	1.70±0.20
(n)	(28)	(12)	(11)	(35)	(34)

consequence, it lost more water by evaporation than the other sites (Table 2). The enclosures had similar vegetation and topography to that of the surrounding site, but both had a lower proportion of dense vegetation (Fig. 1) and of flat ground and slopes facing the two northern quadrants (Atkinson 1985). Enclosure 1 was more south-facing than the predominantly SE-facing enclosure 2 and surrounding site (Atkinson 1985). Air temperatures at site 1 and in its enclosures did not differ significantly between replicates of the experiment (ground level. $F_{1,52}=0.161$, $p=0.690$; 10 cm height, $F_{1,63}=0.426$, $p=0.516$). At both ground level and at 10 cm height, enclosure 1 was slightly but not significantly warmer than enclosure 2, and the surrounding site was significantly cooler than both on average (Table 2). However, enclosure 2 was more desiccating than enclosure 1 ($0.01<p<0.05$) whilst the surrounding site was intermediate and not significantly different from either (Table 2).

Site 2 sloped very gently, mainly toward the south-east (Atkinson 1985) and had the smallest proportion of bare sand of the three sites (Table 1). Although it did not have the most grass, it did have the most grass with thin-edged leaves (grasses excluding *Festuca*, which has rolled leaves; Table 1).

Site 3 comprised mainly south-facing dune slopes together with the edge of a dune slack which was flat (Atkinson 1985). This site was sheltered by trees, like site 2, and had denser vegetation on average than the other sites (Fig. 1. Table 1).

No significant differences in levels of grass nitrogen were found among the sites ($F_{4,49}=0.87$, $p=0.49$; Table 1).

TABLE 2

Sites (enclosures) with the highest and lowest rates of evaporative water loss and air temperature

	Highest				Lowest
Water evaporation rates*	1(2)	1	1(1)	2	3
Air temperature† : ground level	1(1)	1(2)	1		
: 10 cm height	1(1)	1(2)	1		

Underlining joins together sites and enclosures between which no significant difference was found.

*Wilcoxon Matched-Pairs Signed-Ranks Tests performed on daily mean rates, Pcrit = 0.01.

† SNK test, Pcrit = 0.05.

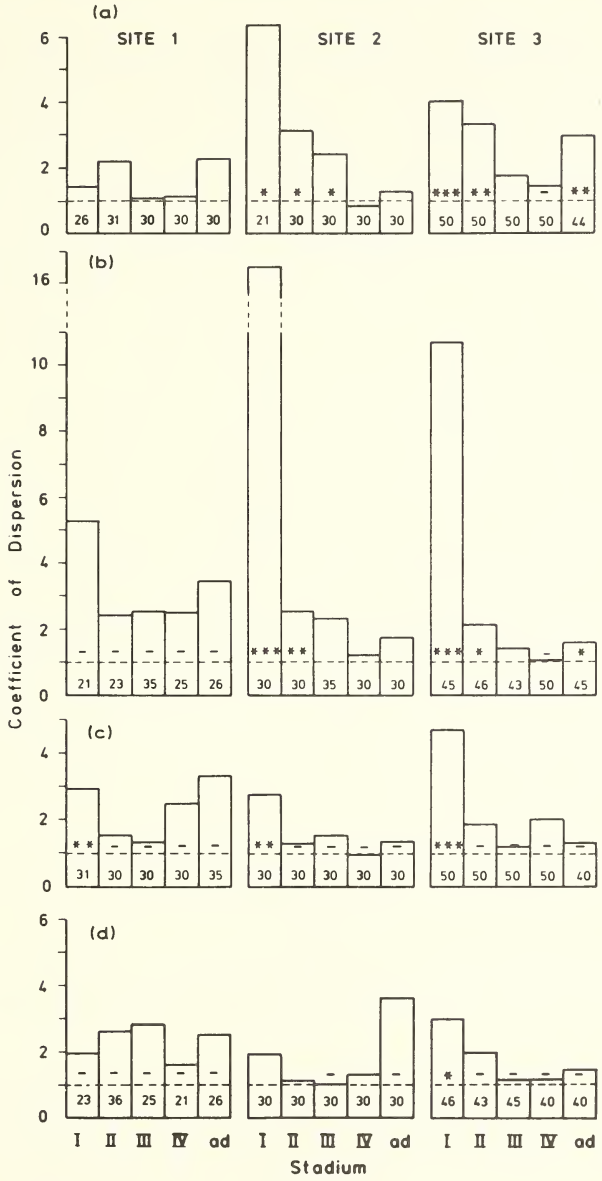

FIGURE 2

Coefficients of dispersion for each stadium at its peak density: (a) *M. maculatus* 1981, (b) *M. maculatus* 1982, (c) *C. brunneus* 1981, (d) *C. brunneus* 1982. Numbers within columns denote the numbers of quadrats sampled. Lack of symbol above number indicates the distribution is not significantly different from Poisson; other symbols are described in Table 4

Aggregation and Association with Habitat

The degree of aggregation of the grasshoppers was estimated by dividing the variance in their numbers per quadrat by the mean number per quadrat. This quantity is the Coefficient of Dispersion. A high coefficient of dispersion means that the grasshoppers are aggregated (Southwood 1978). The Appendix shows that grasshoppers were often highly and significantly aggregated early in the season but then became progressively less so. However, their density also declined during the season, and when small numbers are sampled the relationship between variance and mean is constrained mathematically (Taylor & Woiwod 1982). So the grasshoppers may not necessarily have lost all their aggregative behaviour late in the season (Taylor 1984). This is supported by the fact that, at their respective peak densities, adults were more aggregated than fourth-instar nymphs in eleven of the twelve populations (Fig. 2).

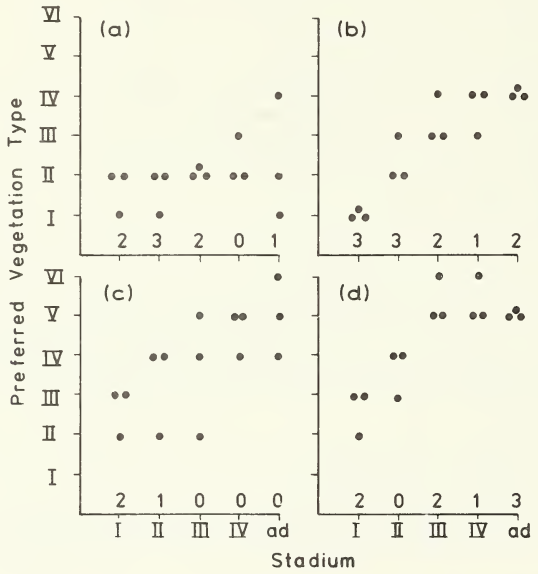

FIGURE 3

The preferred vegetation types of successive stadia: (a) *M. maculatus* 1981, (b) *M. maculatus* 1982, (c) *C. brunneus* 1981, (d) *C. brunneus* 1982. Numbers indicate the number of sites where there was a significant association with particular vegetation types (χ^2 tests)

These results reinforce and quantify previous accounts of dispersal by nymphs away from aggregations at hatching sites, followed by the subsequent re-aggregation of adults for courtship and oviposition (Richards & Waloff 1954, Lensink 1963, Young 1979). But these other studies do not test statistically whether the movement away from hatching sites is due partly to a preference for denser vegetation, or is purely a consequence of dispersal away from other individuals. To distinguish between these hypotheses, we noted, for each instar near its peak density (peak density plus adjacent visits when density was >50% of peak), the number of quadrats of each vegetation type containing either some or none of that instar. This was performed for each species in each year and at each of the three sites. then, for each combination of vegetation type and instar, a measure of strength of association was calculated (χ^2 from the observed

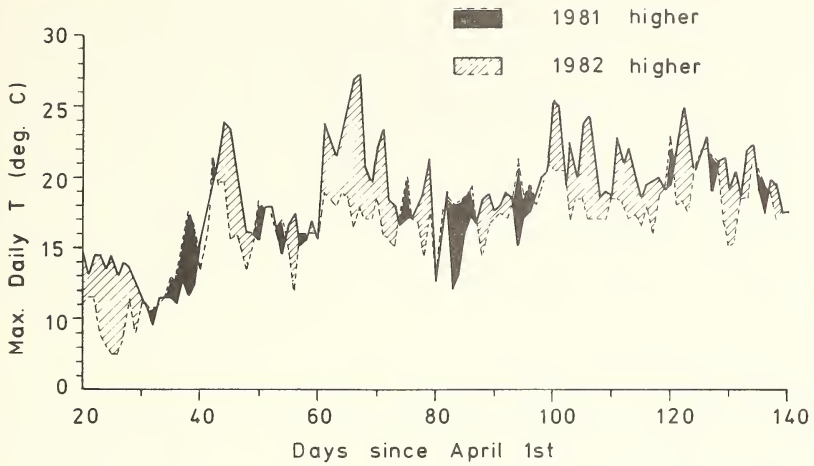

FIGURE 4
Seasonal change in maximum daily temperature in 1981 and 1982

numbers of occupied and unoccupied quadrats and the numbers expected if the grasshoppers were unselective. If nymphs were simply dispersing from hatching sites to reduce crowding, and then re-aggregating there as adults, first-instar nymphs and adults should be associated with sandy areas, especially vegetation types I and II, but no consistent association should be found for the other instars. If, however, dispersal is associated with a real avoidance of sparse vegetation, or preference for dense, then a clear pattern should emerge for these other instars.

TABLE 3
Peak densities of each species of grasshopper at each site (or enclosure) in 1981 and 1982

	Highest density				Lowest density
M. maculatus 1981					
site (enclosure)	2	1(2)	1(1)	1*	3
density (no. m^{-2})	7.2	5.8	3.4	3.1	1.9
M. maculatus 1982					
site (enclosure)	1(2)	1(1)	2	1	3
density	19.4	9.2	6.3	4.0	2.4
C. brunneus 1981					
site (enclosure)	1(2)	2	3	1(1)	1
density	4.0	2.2	1.4	1.3	1.0
C. brunneus 1982					
site (enclosure)	1(2)	1(1)	2	3	1
density	5.1	2.6	2.5	1.6	1.4

*Site 1 refers to the original unextended site in both years.

Fig. 3 indeed shows that the most preferred vegetation type changed during nymphal development from sparse for the early instars to denser for later ones, including the adults. Moreover. *C. brunneus* was associated with denser vegetation than *M. maculatus* ($z=4.541$, $p<0.0001$, $n=30$ pairs, Wilcoxon's Matched-Pairs Signed-Ranks test) and grasshoppers were associated with denser vegetation in 1982 than 1981 ($z=-2.829$, $p=0.005$, $n=30$ pairs, Wilcoxon). Nineteen eighty-two was hotter (Fig. 4) and drier (Ainsdale Sand Dunes NNR, unpublished data) than 1981. Also, when χ^2 tests were performed to examine whether grasshoppers exhibited selectivity amongst all the vegetation types, there were more significant deviations from the null hypothesis of non-selectivity in 1982 than in 1981 (20 cf. 10; Fig. 3). A further hypothesis – that second and third-instar nymphs did not really prefer the intermediate vegetation but were simply on their way to some preferred but distant dense vegetation – is unlikely to be true because each site was a complex mosaic containing sandy areas in close proximity to denser vegetation.

Grasshopper Density

Among the three main sites, densities at site 2 were consistently the highest (Table 3). The large amount of grass with thin-edged leaves (all grasses except those with rolled leaves, i.e. *A. arenaria* and *Festuca* spp.) at site 2 (Table 1) and the relatively large areas of suitable vegetation (Fig. 1), especially for *M. maculatus* (Fig. 3), might explain this. Small nymphs, of C. *parallelus* at least, have been shown to have difficulty feeding on the rolled leaves of *Festuca* (Bernays & Chapman 1970). Neither the amounts of nitrogen in grass leaves, nor the availability of sandy oviposition sites or total grass seemed directly responsible for the higher densities at site 2 (Table 1).

C. brunneus was relatively more abundant in relation to *M. maculatus* at site 3 which had the densest vegetation (Fig. 1; Tables 1 & 3) – a result consistent with the association of this species with denser vegetation within a site (Fig. 3).

The densities of grasshoppers in enclosure 1 were not strictly comparable between years because adult females were temporarily removed on several occasions in 1981 in order to collect egg-pods for another experiment (Atkinson & Begon 1987a). Despite this, between 1981 and 1982 the peak population size in enclosure 1 increased more than in all other areas except enclosure 2 (Table 3). This increase inside the enclosures ws associated with higher levels of grass nitrogen, but the results are merely suggestive since the differences in the latter were not significant (Table 1). In enclosure 2, conditions seemed to have been more favourable for *M. maculatus* which showed a three-fold increase in numbers compared wih only a 28% increase in *C. brunneus*. This may have been because the enclosures lacked the dense vegetation (Fig. 1), and hence the less desiccating conditions (Ruscoe 1970), into which *C. brunneus* tended to move (Fig. 3). Enclosure 2 was especially desiccating (Table 2). Tall dense vegetation also provides a means by which grasshoppers can potentially regulate their body temperature, since the air was significantly cooler at 10 cm above ground than at ground level ($t=6.72$, $p<0.001$). Unlike the experiment described by Grayson and Hassall (1985) in which the vegetation structure changed markedly where rabbits were excluded, the only noticeable effect on the enclosed vegetation was an apparent increase in the number of flowering heads of the grasses.

Mortality and Emigration

A Comparison of Adult and Junvenile Losses

Estimates of rates of loss were derived by regressing log population density against time, starting from the peak density of the stadium in question (modified from Richards and Waloff (1954)). Potential problems with this method, due to serial autocorrelation and to errors caused by selecting inappropriate peak densities, were irrelevant to our analysis which compared the qualitative changes in slope within survivorship curves, and examined for general trends among sixteen such curves rather than quantitative differences between pairs. Other, more sophisticated, analyses would have incorporated unjustifiable

TABLE 4

Estimated average rate of loss of all grasshoppers†, second-and-subsequent stadia, and adults from each population in each year (†Not calculated where peak not observed). *denotes 0.01<p<0.05; **p<0.01

Year	Site (enclosure)	Stadia	*M. maculatus* Correlation coefficient	N	Daily rate of loss (%)	*C. brunneus* Correlation coefficient	N	Daily rate of loss (%)
1981	1	All	–	–	–	−0.87**	15	2.5
		II+	−0.90**	14	3.2	−0.78**	11	2.9
		Adult	−0.90**	9	4.9	−0.36	6	2.3
	1(1)	All	–	–	–	−0.73**	11	2.8
		II+	−0.94**	14	2.9	−0.70**	11	2.6
		Adult	−0.92**	11	3.7	−0.85*	6	7.0
	1(2)	All	−0.88**	14	3.6	−0.85**	15	3.0
		II+	−0.86**	12	4.1	−0.78**	13	3.0
		Adult	−0.88**	9	5.8	−0.55	8	3.4
	2	All	−0.93**	16	3.6	−0.91**	14	3.8
		II+	−0.92**	13	4.1	−0.85**	12	3.8
		Adult	−0.89**	9	5.5	−0.72*	8	4.6
	3	All	–	–	–	−0.96**	14	2.6
		II+	−0.93**	11	5.1	−0.96**	11	3.0
		Adult	−0.92**	10	5.4	−0.92**	8	3.0
1982	1	All	−0.94**	20	2.8	−0.93**	18	2.5
		II+	−0.92**	16	2.8	−0.86**	14	2.4
		Adult	−0.94**	10	4.2	−0.82**	9	3.2
	2	All	−0.95**	20	3.6	−0.90**	18	1.8
		II+	−0.94**	18	3.7	−0.85**	15	1.3
		Adult	−0.95**	12	4.9	−0.82**	8	2.2
	3	All	−0.96**	21	3.6	−0.91**	20	2.2
		II+	−0.96**	18	3.9	−0.81**	15	2.2
		Adult	−0.94**	15	4.5	−0.71**	11	2.6

assumptions and were therefore avoided. Accumulated totals for the stadium were used to derive the peak density since this avoided confusing the effects of moulting with those of mortality or emigration (Southwood 1978). The slope of this line gives an average rate of loss for the stadium and all subsequent instars, including adults. Curves were fitted starting at the peak density of (a) first-instar nymphs,(b) second-instar nymphs, and (c) adults. A small constant value (0.01) was added to every density so that zero counts prior to the end of the season could be used. Also each point was weighted according to the number of samples taken.

Non-significant regressions were obtained for *C. brunneus* adults in 1981 from sites 1 and 3 (Table 4), probably as a result of the small sample sizes and the fact that the more mobile *C. brunneus* was not contained within the boundaries of the sites. All other regressions were significant, and mostly highly significant.

In all of the eleven cases where these regressions allowed comparisons to be made, adults were lost from the populations at a faster daily rate than juveniles (Table 4). Monk (1985) also found this in *C. brunneus* and *C. parallelus*, in nine out of ten populations which showed unambiguous differences.

In the five populations of *M. maculatus* in which the rate of loss of all grasshoppers was compared with that of second instars and later stages, the difference in every case indicated that the daily losses of first-instar nymphs were less than the average for subsequent stages (Table 4). In *C. brunneus*, five of the eight comparisons indicated the opposite trend (Table 4). In other species, early nymphal mortality has been found to be either negligible (Chapman & Page 1979) or very variable and dependent on weather (Pickford 1960).

Effects of Species, Site, Year, Density and Food Abundance

Differences in the rates of loss of all stadia between populations, between years and between species were examined together with the effects of initial density, and of initial density divided by each of two estimates of food abundance – the amounts of all grass (excluding the inedible *A. arenaria*) and of thin-edged grasses only. Simultaneous analyses of variance and covariance were performed on the slopes of the thirteen 'survivorship' curves using the Generalised Linear Interactive Modelling (GLIM) computer package (Baker & Nelder 1977). This analysis was repeated for the sixteen 'survivorship' curves of adults only.

Variation in Losses of All Stadia

The combinations of 'species' and 'year' explained 62% of the variation in the rate of loss of all stadia ($F_{3,9}=4.99$; $0.05>p>0.25$). No other variable had a further significant effect. *M. maculatus* was lost more rapidly from the populations than was *C. brunneus*, and this was probably due to differences in survivorship rather than emigration since *C. brunneus* appeared to emigrate more from the sites. This difference between species was especially marked in 1982 when the weather during the nymphal period was warmer (Fig 4) and drier (Ainsdale Sand Dunes NNR, unpublished data), and when both species, but especially *C. brunneus*, lost animals at a slower rate. Other grasshopper populations also generally suffer higher mortality in cooler weather (Dempster 1963), yet emigration is greater in hotter drier years, as we observed in this study. Thus the higher rate of grasshopper loss in 1981 was probably due to higher mortality rather than emigration.

Numbers of *C. brunneus* declined faster in enclosure 2 than in enclosure 1 (Table 4). This corresponded with the significantly higher rate of evaporation in the former (Table 2). When the average mortality rate of each species was examined after moult into the second instar, the ranks of mortality rates in each species (Table 4) exactly corresponded with the ranks of evaporation rates from the enclosures and the surrounding site (Table 2), but no correlation with temperature was observed (Table 2).

Variation in Adult Losses

M. maculatus generally occurred at higher densities and suffered higher losses (Table

4). 'Density' explained 25.6% of the variance in adult losses ($F_{1,14}$=4.83; 0.05>p>0.25), whereas 'species' explained only marginally less (25.3%; $F_{1,14}$=4.74; 0.05>p>0.25). Within each species the rate of adult loss was not significantly density dependent (*M. maculatus*, r=−0.386, p=0.173, n=8; *C. brunneus*, r=−0.270, p=0.29, n=8). The overall density effect may therefore be spurious. No other factor was able to explain a significant amount of variation in log 'survivorship' when either 'density' or 'species' was controlled.

TABLE 5

Mean estimated developmental periods between second instar and adulthood for each population

Species	Year	Site (enclosure)	1	1(1)	1(2)	2	3
			Mean developmental periods (days)				
M. maculatus	1981		37.0	37.2	34.0	38.2	35.4
	1982		27.0	–	–	27.0	27.2
C. brunneus	1981		51.2	49.8	44.0	42.6	42.8
	1982		40.6	–	–	39.4	41.8

Developmental Period

Analysis

On each visit the proportion of the population comprising second or later instars was calculated so that a cumulative recruitment curve into the second instar could be drawn. A cumulative recruitment curve for the adult stage was also drawn, and the period between points on the two curves for a particular cumulative frequency was measured. 20, 40, 60 and 80% cumulative frequencies were used. A mean developmental period was calculated using these four estimates for each species at each site or enclosure in each year. The effects on mean developmental period of 'species', 'site (or enclosure)', and 'year' were then examined. Simultaneous analyses of variance and covariance were then performed on each of the four cumulative frequencies, using the GLIM statistical package (Baker & Nelder 1977). This tested the effects of 'species', 'site (or enclosure)', 'year' and 'date of moult into the second instar' on the subsequent developmental period

Variation in Developmental Period

M. maculatus both moulted into the second instar and emerged as an adult earlier in the season than *C. brunneus* (Atkinson 1985). The larger *C. brunneus* had a longer mean developmental period than *M. maculatus* ($F_{1,14}$=23.254, p<0.001, and nymphs developed faster in 1982 than in 1981 ($F_{1,14}$=4.838, 0.05>p>0.025), especially *M. maculatus* ('Species x year' interaction, $F_{3,12}$=35.270.p<0.001; Table 5). This corresponds with the higher temperatures experienced by nymphs in 1982 compared with 1981 (Fig. 4). No effect of 'site (or enclosure)' was noted on the mean developmental period of the grasshoppers ($F_{4,11}$=0.283,p>0.75), even when the artificially enclosed populations were ignored (Table 5).

For every cumulative frequency the same model provided the best explanation for differences in developmental period, namely the interaction of 'species x year x date of moult into second instar', which explained between 80% and 93% of the variance (20% cumul. freq., $F_{4,11}$=35.94; 40%, $F_{4,11}$=26.63; 60%, $F_{4,11}$=24.50; 80%, $F_{4,11}$11.07, all p's <0.001). In each of the sixteen combinations of species, year, and cumulative frequency, later dates of moult into second instar were followed by shorter subsequent developmental periods (all parameter values are negative in Table 6). This trend was consistent despite changes in the rank order of moulting dates among populations and cumulative frequencies (Atkinson 1985). The faster development of late starters may be strategic

TABLE 6

Estimates of parameters (+SE) relating estimated date of moult into second instar (days since April 1) to the subsequent developmental periods (days) in each species and year

Cumulative frequency (%)	Grand Mean	*M. maculatus* 1981	*M. maculatus* 1982	*C. brunneus* 1981	*C. brunneus* 1982
20	82.16 (11.48)	−0.873 (0.251)	−1.43 (0.304)	−0.442 (0.198)	−0.910 (0.248)
40	78.75 (13.44)	−0.741 (0.254)	−1.24 (0.318)	−0.411 (0.192)	−0.732 (0.254)
60	79.29 (11.93)	−0.711 (0.197)	−1.164 (0.260)	−0.421 (0.153)	−0.643 (0.202)
80	80.1 (11.54)	−0.656 (0.165)	−1.015 (0.231)	−0.435 (0.133)	−0.607 (0.183)

(D. Atkinson and R. Graham, unpublished). Alternatively, it may be caused by a rise in mean ambient temperature and number of sunshine hours during the season, both of which will increase developmental rates (Pickford 1960, 1966, Begon 1983).

Grasshoppers in the warmer enclosure 1 generally moulted into the second instar earlier than those in the main sites or in the other enclosure, but, presumably for the same reasons outlined above, the nymphs from the other sites frequently developed more rapidly thereafter (Table 6). Nonetheless, the animals in enclosure 1 maintained their advantage to the extent that they were generally the first to moult into adults (Atkinson & Begon 1988).

Discussion

Species Differences

Both species became less aggregated as the nymphs dispersed from hatching sites, but the adults then re-aggregated to an extent. However, nymphs in each instar were associated with particular vegetation types, which they presumably preferred because each site was a fine-grained mixture of types. We suggest that the habitat preferences, both within and between species, are a compromise mainly between the structure which provides the least desiccating microenvironment and largest scope for regulating body temperature (i.e. dense vegetation; Ruscoe 1970, Parker 1982), and the structure in which animals can move most easily and especially escape predators and disturbance. (Larger animals jump farther and higher and should therefore cope better with dense vegetation (Gabriel 1985) – personal observations of small grasshoppers struggling in dense vegetation support this). This suggestion accounts for (i) the movement of nymphs of both species from sparse to dense vegetation as they grow; (ii) the occurrence of *C. brunneus* – the larger species – in the denser vegetation; and (iii) the association of grasshoppers with denser vegetation in 1982 – the more desiccating year. Moreover, each species seemed to be favoured by its preferred vegetation types. *C. brunneus* was relatively more abundant in relation to *M. maculatus* at site 3 which had the densest vegetation, but it increased relatively little in the enclosures, which contained very little dense vegetation.

M. maculatus was more numerous at each site and had, overall, lower rates of survival than *C. brunneus*. Nymphs of *M. maculatus* developed more rapidly, mainly, it seems, because this species matures at smaller sizes (Richards & Waloff 1954, Atkinson & Begon 1988). (We have estimated daily growth rates – 1.08 for *M. maculatus* and 1.07 for *C. brunneus* – which are similar despite the fact that they developed at different times of the season and hence under different conditions.)

Amongst first-instar nymphs, survivorship was relatively high in *M. maculatus* compared to later stages, whereas in *C. brunneus* it was relatively low. Associated with this, perhaps, *M. maculatus* has larger eggs (and hatchlings) than *C. brunneus* (Atkinson & Begon 1988), but second-instar nymphs of the two species are similarly-sized, and later stages are larger in *C. brunneus* than *M. maculatus* (Richards & Waloff 1954). This implication of size-specific mortality could be extended to help explain the species differences in survivorship.

Thus, *M. maculatus*, by virtue of its small adult size, matures much earlier than *C. brunneus*. It is therefore likely to be favoured in years where the growing season is short. Monk (1985) also found that nymphs of *C. brunneus* and *C. parallelus* developed particularly quickly at a site where the period favourable for growth and reproduction was short. *M. maculatus* also has a greater apparent tolerance of sparser vegetation, and desiccating conditions (Atkinson & Begon 1987b), and appears also to be less mobile. Hence, it is less likely to be able to escape harsh environmental conditions by moving into appropriate habitats or microhabitats, and might also be expected to be adapted more to specific sites, rather than to a widespread area. This idea is supported by the greater differences in life-history observed between populations of this species than between those of *C. brunneus* (Atkinson & Begon 1987a, 1988).

Factors Affecting General Abundance

Among the three unenclosed areas, highest densities of both species were found at site 2 which was characterized especially by having most grass with thin-edged leaves. These grasshoppers may compete for and hence be limited by grass with thin-edged leaves, since large eggs (and therefore hatchlings) were found in populations where there was little such grass for the first-instar nymphs (Atkinson & Begon 1987b). Yet we found no effects of the amount of this grass on rates of grasshopper loss. This may be because large hatchlings are better able to avoid starvation when thin-edged leaves are scarce (Atkinson & Begon 1987b). Also, such mortality may not have been detected among the losses of all stadia if it only affects first-instar nymphs, whose mandibular gapes are too small to cope with rolled leaves (Bernays & Chapman 1970).

Higher temperatures in the enclosures may have contributed to increased abundance by increasing rates of nymphal growth, and thus increasing adult size and precocity and hence reproductive output. In addition, the increased temperatures are likely to have increased reproductive output directly (Visscher *et al.* 1979, Begon 1983).

Development was certainly more rapid in 1982, when the temperatures were higher and the number of sunshine hours greater than in 1981. It might be expected that this greater rate of metabolic activity would extract a physiological cost in reducing the chronological life-span of the grasshoppers. Nonetheless, the higher rates of grasshopper loss in 1981 support the generalization that mortality in temperate acridids is highest in cool wet weather (Dempster 1963, Pickford 1966)

Our results have implications for conserving these species. A wide rather than a narrow range of microhabitats should maintain more stable population sizes, and denser vegetation is likely especially to favour later instars and *C. brunneus*. Finally, we suggest that seasons with very little warm sunny weather will have a more harmful effect on numbers of *C. brunneus*, the larger species, than on *M. maculatus*.

Summary

Nymphs of the grasshoppers *Chorthippus brunneus* (Thunb.) and *Myrmeleotettix maculatus* (Thunb.) became less aggregated as the season progressed at each of three sand-dune sites in north Merseyside, but re-aggregated to some extent as adults. As development proceeded, each successive stadium generally became associated with progressively denser vegetation. Dense vegetation was especially preferred in 1982, which was hotter and drier than 1981, and especially preferred by *C. brunneus*, the larger species.

Adults were lost from the populations (by mortality and emigration) at a greater rate than juveniles.

C. brunneus individuals were lost at a lower rate from the populations than were *M. maculatus* which were usually more crowded, a difference apparently due to better survival of *C. brunneus* rather than reduced emigration.

Between 1981 and 1982, grasshopper densities increased much more in two field enclosures, which had high mean temperatures, than in the three unenclosed areas. Losses of grasshoppers from the populations were more rapid in the cooler, wetter 1981 season than in 1982. However, when grasshopper losses within each enclosure and in the surrounding site were compared, high losses occurred where evaporation rates were high. This difference can be explained by the relatively small amounts of dense vegetation (refuges) in the enclosures.

Discussion on how spatial and temporal changes in habitat and microhabitat are likely to affect the abundance of the two species in different ways is also provided.

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APPENDIX

Seasonal change in coefficients of dispersion (C.D.) of each species at three sites in 1981 and 1982 (χ^2test against Poisson; $^+$NS; *p<0.05; no symbol, test criteria not satisfied)

Year	Site																						
1981	1	Sample date (day/mth)	13/5	28/5	7/6	18/6	26/6	7/7	18/7	29/7	9/8	15/8	24/8	31/8	13/9								
		C.D. (*M. maculatus*)	1.52$^+$	2.52$^+$	1.42*	1.84$^+$	1.10$^+$	1.31	2.16*	1.27	1.62	1.62	0.83	2.60	1.29								
		C.D. (*C. brunneus*)	1.40$^+$	2.56*	2.15	2.68*	4.00	1.79	2.86	2.34	1.17	–	–	–	–								
		N	26	31	30	30	30	30	30	30	30	30	35	30	34								
	2	Sample date	9/5	21/5	24/5	3/6	15/6	23/6	4/7	12/7	25/7	5/8	14/8	23/8	30/8	12/9	17/9	24/9					
		C.D. (*M. maculatus*)	2.75*	8.54*	8.49*	6.68*	4.42*	2.02$^+$	1.61$^+$	1.85*	1.30$^+$	1.03$^+$	1.17	1.50	1.86	1.61	2.00	2.12					
		C.D. (*C. brunneus*)	0.95	2.93*	1.54	3.26$^+$	1.85$^+$	1.56$^+$	2.54$^+$	1.12	1.22	1.64	1.17	1.39	1.17	–	2.11	0.96					
		N	31	21	20	30	30	30	30	30	30	30	30	30	30	24	33	38					
	3	Sample date	19/5	31/5	11/6	22/6	30/6	9/7	24/7	1/8	11/8	20/8	27/8	3/9	16/9	22/9	30/9	14/10					
		C.D. (*M. maculatus*)	5.88*	5.64*	3.01*	1.57$^+$	1.89*	1.57$^+$	2.88*	1.21$^+$	1.27	1.26	0.93	2.04	1.46	–	–	–					
		C.D. (*C. brunneus*)	2.97*	2.69*	3.94*	2.16*	1.49$^+$	2.67*	1.35$^+$	1.95$^+$	1.77	2.09	1.49	1.23	1.22	0.90	1.32	0.98					
		N	50	50	50	50	44	50	46	45	40	26	44	50	48	50	50	45					
1982 (unextended)	1	Sample date	26/4	6/5	12/5	16/5	21/5	26/5	31/5	7/6	16/6	26/6	2/7	11/7	18/7	26/7	5/8	19/8	27/8	3/9	11/9	16/9		
		C.D. (*M. maculatus*)	5.93	6.50	4.50	3.64	2.06	3.38	2.23	1.46	1.73	2.00	1.89	3.49	1.20	1.40	1.42	1.64	1.81	0.87	1.73	2.47		
		C.D. (*C. brunneus*)	2.14	4.59	6.30	2.08	1.09	3.25	3.89	3.06	2.43	2.43	1.40	–	1.61	–	2.54	–	0.90	–	0.92	–		
		N	20	21	28	23	20	35	25	25	21	24	26	26	23	21	26	21	22	32	40	38		
	2	Sample date	29/4	8/5	14/5	18/5	23/5	27/5	3/6	9/6	17/6	27/6	6/7	13/7	20/7	28/7	10/8	25/8	1/9	10/9	15/9	22/9	10/10	
		C.D. (*M. maculatus*)	8.89*	17.46*	7.51*	3.94*	3.53*	3.88*	1.95$^+$	1.64$^+$	2.35$^+$	1.54$^+$	1.32$^+$	1.09$^+$	1.33$^+$	1.53$^+$	2.15$^+$	0.83	1.10	1.32	0.98	–	–	
		C.D. (*C. brunneus*)	1.28	1.91	2.06$^+$	2.20*	1.45$^+$	2.16$^+$	1.16$^+$	1.39	1.54	2.10	1.27	1.10	2.14	3.63	1.91	2.11	2.32	1.46	1.17	1.33	1.28	
		N	30	30	30	30	30	35	30	30	30	30	30	30	30	30	30	36	32	50	50	50	30	
	3	Sample date	28/4	9/5	15/5	19/5	24/5	28/5	5/6	12/6	20/6	23/6	30/6	7/7	14/7	17/7	25/7	3/8	11/8	26/8	2/9	6/9	9/9	9/10
		C.D. (*M. maculatus*)	4.56*	10.50*	4.33*	3.51*	2.24*	2.41*	1.14$^+$	1.80*	1.63	0.96$^+$	1.40	1.13	1.18	1.20	0.99	1.23	1.63	0.92	–	–	–	–
		C.D. (*C. brunneus*)	5.15	3.92*	2.53*	3.38*	2.78*	4.57*	1.75$^+$	1.83$^+$	1.65	1.62*	1.25	1.19	1.09	0.89	2.06	1.48	1.79	0.98	1.36	2.00	1.63	1.65
		N	50	45	40	46	43	50	45	45	15	40	46	43	17	41	32	40	50	40	50	25	50	42

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UNUSUAL WINTER FEEDING TACTICS OF FOXES (*VULPES VULPES*) ON SPURN PENINSULA

P. N. JOHNSON

During the mid 1970s I visited the Spurn Peninsula in the evenings during the months of December, January and February accompanying friends on all night beach fishing trips. During conversations with other beach fishermen, many of them complained about the theft of bait and fish from their bags during the night. Not until I experienced this myself in 1977 did I find clues as to the real culprits.

Many of the fishermen arrive at high tide, and move down the beach following the falling tide; they illuminate the surrounding area with Tilley lamps over an area approximately 30 feet in diameter. Fish caught early in the evening are placed in bags, which are often left in the original fishing position as the men follow the tide down, moving their lamps with them. Once the catches are no longer illuminated, the ever opportunistic fox population moves in to remove the fish and any other edible items from the fishermen's bags.

Realizing this, I began to remain high on the beach and observe the line of fishermen as they moved down it. On several occasions I observed several foxes patrolling the beaches, walking silently on the wet sand, remaining on the fringe of illumination behind the line of fishermen. On 22 January 1979 I observed one fox feeding on lugworms from the bait tin of a fisherman who was preoccupied with watching his rod in case he missed a bite; the fox was only two feet behind him and very well illuminated.

Possibly the foxes originally learned to associate fishermen with food by picking up discarded sandwiches and other snacks; they now exploit the resource fully during the worst periods of the winter.

Fish have been recorded in the diet of the Spurn fox population throughout the year (Howes 1974, 1980), though this was attributed to scavenging along the shore line.

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BOOK REVIEWS

The Oxford Companion to Animal Behaviour edited by **David McFarland**. Pp. 685, with numerous black and white drawings and graphs. Oxford University Press. 2nd Edition. 1987. £12.95 paperback.

First published in hardback form in 1981, this well produced book has been re-issued in both hardback and paperback form. The new edition has been reprinted with corrections and a new index. This is not only a book to be enjoyed by all naturalists regardless of their specializations, but will also be of great value to teachers and students of biology and related subjects. The text is clear, accurate and concise, as are the line diagrams.

It appears to be basically free from errors and it is perhaps being somewhat pedantic to mention the primary use of American names for species such as the Swallow, Sand martin and Razorbill.

The temptation to buy this book could be very high if it is encountered whilst browsing in a bookshop and it will be a valuable asset to a naturalist's library.

JEK

Ants of the British Isles by **Gary J. Skinner**. **Longhorn Beetles of the British Isles** by **Norman Hickin**. Shire Natural History series, 21 and 22, Shire Publications, Princes Risborough, 1987. Each with 24 pages, including colour plates and b/w figures. £1.25.

Each booklet in the series aims to introduce the interested layman or student to the study of a selected group. That on ants fulfils its aim admirably and concisely and packs in an immense amount of information about the ways of ants. All the generally common species are mentioned and using the simple key provided anyone should be able to identify the common ants. The illustrations are clear and pertinent and there is a short list of more advanced texts.

Longhorn Beetles is less satisfactory and in attempting to cover both native species and those that are imported in timber, it probably covers too wide a field. Many of the beetles named and figured are unlikely to be encountered and some of our most common ones are not mentioned or not figured. There is a good account of the biology of the house longhorn, which fortunately is very restricted in this country, and helpful information is given on how to find both natives and imports. The colour photographs in both booklets are very good.

JHF

Butterflies in the Harrogate District by **M. Barnham** and **G. T. Foggitt**. Pp. 54, with 18 black and white photographs and over 30 maps. Privately published. Available from M. Barnham, 10 Netheredge Drive, Knaresborough, N. Yorkshire. 1987. £3.95, paperback.

This booklet is the result of a ten-year survey (1976–1985) of butterflies by members of the Harrogate and District Naturalists' Society. A concise introduction sets the scene and includes necessary information on landscape and geology, which is accompanied by three clear maps. The body of the report is divided into three sections, with Part I devoting at least one page to the habits of each species, as noted in the Harrogate district, alongside a distribution map based on 1 km squares. Part II is essentially a chart showing flight periods, while Part III summarizes distribution and relative abundance using maps and tables. Butterflies are pictured at the beginning of each part and photographs of habitats are scattered throughout Part I, enhancing the text enormously.

The only noticeable fault is in the systematic order, where the Nymphalidae and Wall split Orange-tip from the Pieridae. Nevertheless, it is very well presented and full of interesting observations.

PQW

HATFIELD CHASE: THE LOSS OF DRAINAGE CHANNEL HABITAT

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Introduction

Much of the productive agricultural land in the low lying area to the east of the River Trent is below the level of the river and so depends on a rigorous drainage regime based on an extensive network of drainage channels. This aquatic habitat of drains and ditches is all that remains of the fens, pools and meres which made up the area before Cornelius Vermuyden began the effective drainage of the area, in the 17th century (Cory 1985).

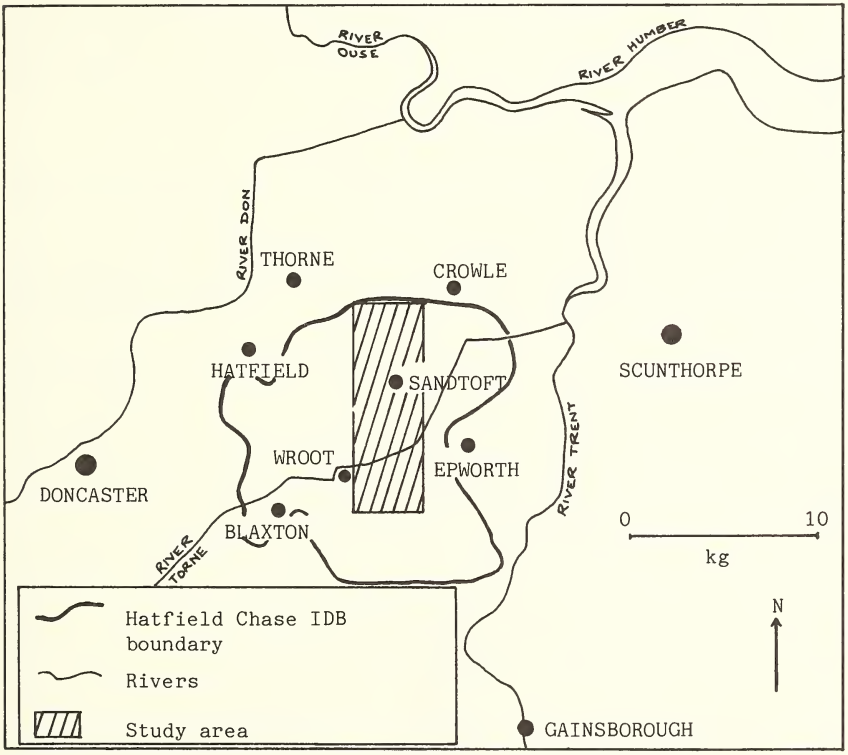

FIGURE 1
Hatfield Chase and the study area

Hatfield Chase (Fig. 1) typifies much of this reclaimed land. The drainage system is divided into the drains of the Severn–Trent Water Authority (STWA) and the Hatfield Chase Corporation Internal Drainage Board, all of which are currently managed by the STWA, and the smaller ditches maintained by the farmers. In 1986 the flora of the drainage channels of Hatfield Chase was found to consist of 94 species (Wade & Wingfield 1987) including such rarities as *Pilularia globulifera* L., *Ranunculus baudotii*

Godr., *Callitriche hamulata* Kutz ex Koch, *C. truncata* Guss., *Myriophyllum verticillatum* L., *Potamogeton friesii* Rupr., and *Eleocharis acicularis* (L.) Roem. & Schult. (Palmer & Newbold 1983). This habitat is equally vital for a wide diversity of aquatic invertebrates and other animals. A decrease in the length of drainage channel habitat is potentially detrimental to the survival of these species and communities. This loss not only has the direct effect of reducing habitat availability but also increases the stress on the remaining drain and ditch habitat, due to the need to improve their capacity and efficiency as drainage channels. This paper describes the loss of drainage channel habitat from Hatfield Chase and considers the implications for wildlife.

Methods

A search was undertaken for maps of Hatfield Chase which showed the drainage channels. Material was consulted from Lincolnshire Archives, Gainsborough Public Library and Doncaster Central Library and records kept by the STWA were also used. A study area (Figure 1) was chosen which lay almost completely within Hatfield Chase and which had good map coverage. The earliest records which allowed differentiation between channels and other forms of field boundaries were from 1908, and field surveys of existing drains and ditches within the study area were made in autumn 1986. The study area was 28 km^2.

Results

Little change has occurred in the length of drains which are today managed by the STWA. A slight increase in length occurred in 1970 to cater for runoff from the M180 motorway.

The length of ditches maintained by the farmers has decreased over the period 1908 to 1986 by approximately 36%. Closer examination of a part of the study area (7 km^2) with better map coverage suggests that much of this loss (85%) has occurred since the mid-20th century (Figs 2 & 3). Calculations based on the whole survey area show that

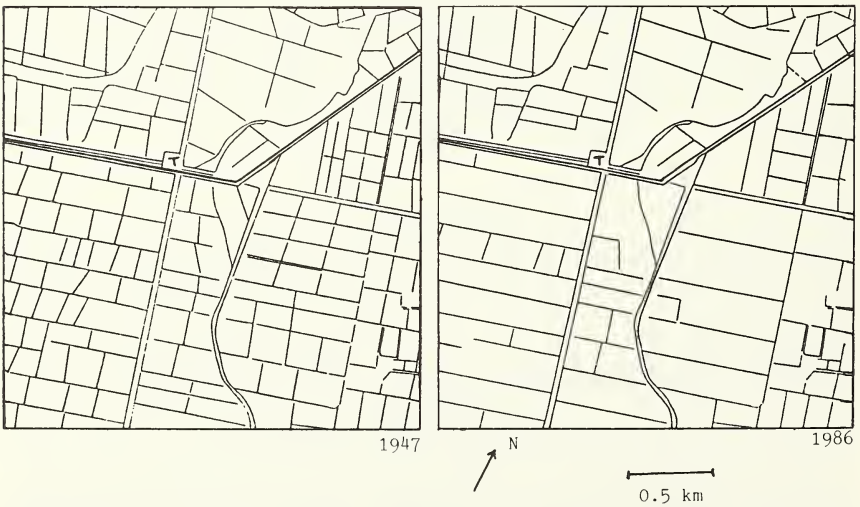

FIGURE 2
Difference in drainage channel distributions in a 7 km^2 area of Hatfield Chase, 1947 and 1986

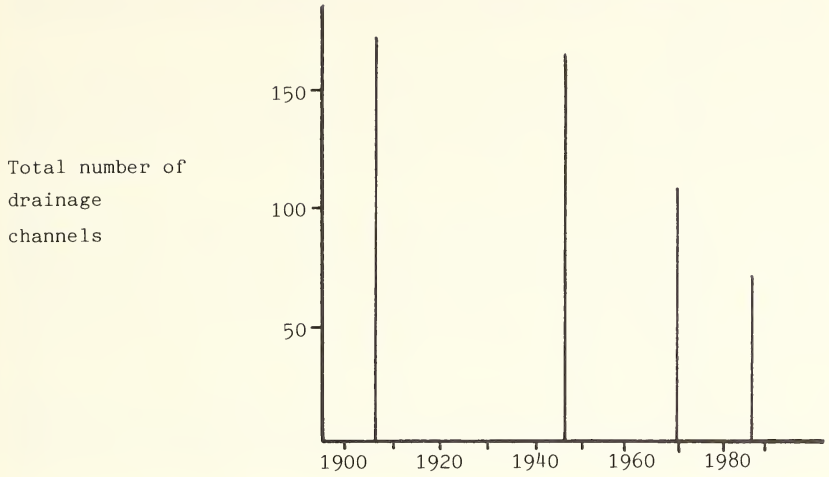

FIGURE 3
Length of farmers' ditches in a 7 km^2 area of Hatfield Chase, 1908–1986, as in Figure 2

up to 1970 the channels lost from the system were shorter than average, but since this date they have been longer than average.

The pattern of loss is not uniform across the area and the percentage of channel length lost over the period 1908 to 1986 ranged from 23 to 51% depending on different land owners.

Discussion

The primary reason for the loss of drainage channels from Hatfield Chase post 1947 is a change in land use and farming technology. One large field is much more efficient to manage with the machines used in arable farming today, than the small fields that exist in an area with an extensive capillary-like network of smaller channels. This development has been speeded by the use of underdrainage which has not only meant an overall lowering of water level within the channels, but has also caused some ditches to become redundant. Discontinued maintenance has allowed such ditches to fill with an accumulation of plant remains, gradually reducing water depth (Mountford & Sheail 1982), a process accelerated by the sandblow problem encountered in parts of the Chase.

Drainage channel loss is not restricted to Hatfield Chase and the surrounding area. Palmer (1986) records a 40% loss of ditch length when permanent pasture in the Pevensey Levels was ploughed up for cereal farming. Under similar circumstances, Driscoll (1983) describes a loss of 33.5% of dykes in Broadland between 1973 and 1981, whereas in the predominantly pastoral Gwent levels the loss over the period 1882 to 1975 was only 14%, some of which was due to industrial development (Wade 1977).

Recent national estimates suggest only an 8.4% loss of ditches from agricultural land between 1947 and 1985 (R. Roberts, pers. comm.). This highlights the extreme decline in the extent of this habitat in low lying areas of drained land such as Hatfield Chase. The situation is further exacerbated by the indirect effect of this loss upon the remaining ditches and drains, an important difference between this linear habitat and that of hedges for example. The reduced storage capacity of the drainage system in times of high precipitation demands that the remaining channels, and particularly the drains, are able

to carry the drainage water efficiently out of the system (Scotter *et al.* 1977). This necessitates a rigorous maintenance employing a range of aquatic weed control measures including herbicides.

Wade and Wingfield (1987) found that on Hatfield Chase the plant communities of the farmers' ditches were substantially different from those of the larger drains. Some of the ditches had low water levels in summer and hence limited conservation value as aquatic habitat. Other ditches, however, supported an important component of the aquatic life of Hatfield Chase.

Summary

A decrease in the length of drainage channels is described for Hatfield Chase. 36% of farmers' ditches have been lost since 1908, most of the decrease occurring since 1947. A slight increase in length is noted for the larger drains. This overall decrease in length will have a detrimental effect on the conservation of the aquatic flora and fauna of the Chase: directly through the loss of habitat and indirectly because of the need for more rigorous management of remaining channels, especially the drains.

Acknowledgements

The assistance of Lincolnshire Archives, Gainsborough Public Library, and Doncaster Central Library, and the cooperation of the land owners and farmers are gratefully acknowledged. This study was funded by the Severn–Trent Water Authority.

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BOOK REVIEW

The Correspondence of Charles Darwin. Volume 2, 1837-1843 (Pp. xl + 603) & **Volume 3, 1844-1846** (Pp. xxxii + 523) edited by **Frederick H. Burkhardt** & **Sydney Smith.** Cambridge University Press. 1987. £30.00 each.

Further instalments of this remarkable edition, which maintain the impeccable standards of the first volume (see *Naturalist* **111**: 36). These letters cover a period of intense creativity, during which Darwin came to recognise the evolutionary origin of species and to formulate his theory of natural selection. His scientific acumen was gaining recognition amongst his peers, and he was also enjoying a period of personal happiness, following his marriage to Emma Wedgewood in 1839. Overall, fascinating insight into the workings of one of our greatest scientific minds.

THE ACULEATE WASPS AND BEES (*HYMENOPTERA: ACULEATA*) OF MY LOCAL PATCH: STRENSALL COMMON, THE FIRST 70 VISITS

M. E. ARCHER

Strensall Common has been found to be an excellent locality for aculeates, having 112 recorded species, two red data book category 3 species, two species unique to Watsonian Yorkshire and some 20 other rarities or local species.

Strensall Common is a site of 690 hectares situated about six miles north-east of York (V.C. 62; SE65). It is one of the few remaining lowland heathlands in the Vale of York. The site is overlain by fluvial sands which have probably been moved by the wind, and now forms a fossil sand dune landscape. The sandy heath was acquired by the Government in 1881 for military purposes (Wilkinson, 1906), and much drainage work was carried out by the army so that the heath could be used for training purposes. The sides of the drainage ditches and dug holes, when situated in sunny places, have provided excellent nesting sites for the soil-nesting aculeates. Silver birch, Scots pine and oak have invaded the drier parts of the heath but sheep-grazing and fires have kept much of the site open. The dead trees, particularly the Scots pine, when in sunny situations, have been used by the aerial-nesting aculeates. The Yorkshire Wildlife Trust owns about 42.5 hectares and its policy of removing trees and tall shrubs from time to time from the drier banked areas and of grazing sheep has had a beneficial effect on the aculeate assemblage.

From voucher specimens and written records it has proved possible to trace 22 visits by other entomologists (= the historical sample). J. H. Elliott made five visits, A. Smith five visits and J. Wood one visit during the 1940s and 1950s. J. H. Flint made ten visits during the 1960s and 1970s while C. J. Smith made one visit during 1980. My own 70 visits (= the Archer sample) cover the period from 1967 until 1985 but most visits were made during 1981, 1982 and 1983; they were distributed throughout the year as follows: April (5 visits), May (16), June (13), July (18), August (12) and September (6). The 22 other visits were also distributed from April until September. The total 92 visits have produced a list of 112 species of which 98 are present in the Archer sample. The apparent lack of records prior to the 1940s is curious, but probably reflects that at that time the main entomological interest was to the west of the county and the use of much of the Common as a firing range must have made access difficult. The collector W. J. Fordham, who lived in the Allerthorpe area and was active in the first part of this century, is perhaps the most notable exception, but there appears to be no record of his having visited Strensall Common.

At the family level the taxonomic distribution of the historical and Archer samples is given in Table 1. Ignoring the bethylid species, the remaining 111 species represent 41.1% of the Yorkshire (Archer, in press) and 21.4% of the British list (Kloet & Hincks, 1978). At the time of writing, Strensall Common is the Yorkshire locality with the largest number of recorded aculeates, although work in progress on localities in South Yorkshire, e.g. Blaxton Common, and other heathland sites, e.g. Allerthorpe Common, will no doubt prove the existence of equally rich sites.

In the following account biological names are according to Kloet and Hincks (1978). I am grateful to J. T. Burn for the bethylid record, *Cephalonomia formiciformis*. The ants (Formicidae) recorded were: *Myrmica rubra*, *M. ruginodis*, *Formica fusca*, *Lasius flavus* and *L. niger*. The social wasps (Vespidae) recorded were: *Dolichovespula norwegica*, *D. sylvestris*, *Vespula austriaca*, *V. rufa*, *Paravespula germanica* and *P. vulgaris*. The social bees (Apidae) recorded were: *Bombus lucorum*, *B. terrestris*, *B. lapidarius*, *B. jonellus*, *B. hortorum*, *B. muscorum*, *B. pascuorum*, *Psithyrus bohemicus*, *P. campestris* and *P. sylvestris*. Of the social species *V. austriaca*, *B. jonellus* and *B. muscorum* should be specially noted. *V. austriaca* is a cleptoparasite of *V. rufa* while *B. jonellus* and *B. muscorum* are widespread local species which since 1960 have suffered a 26% reduction in their distribution in Britain (Williams, 1982). The solitary species found in the historical sample but not in the Archer sample are: *Priocnemis schioedtei*, *Ancistrocerus*

TABLE 1

The number of species and records of aculeates in each family found at Strensall Common from the historical and Archer samples

Family	No. species	No. records (Archer sample only)
Bethylidae	1	0
Chrysididae	6	9
Tiphiidae	2	4
Formicidae	5	–*
Pompilidae	11	35
Eumenidae	4	4
Vespidae	6	–*
Sphecidae	28	122
Colletidae	3	6
Andrenidae	12	53
Halictidae	11	48
Megachilidae	6	10
Anthophoridae	7	27
Apidae	10	–*
Total	112	318

* Number of records not collected for the social families of Formicidae,Vespidae and Apidae.

oviventris, *Crossocerus nigritus*, *Gorytes tumidus*, *Colletes daviesanus*, *Hylaeus communis*, *Andrena fucata*, *A. subopaca*, *Lasioglossum albipes*, *Sphecodes ferruginatus*, *Megachile circumcincta* and *Epeolus variegatus*. Four of these solitary species are notable: *C. nigritus* and *G. tumidus* are Yorkshire rarities, with *G. tumidus* being at the northern end of its distribution in England; *G. tumidus*, *C. daviesanus* and its cleptoparasite *E. variegatus* are local species nesting in sandy areas. The 78 solitary species of the Archer sample, with their recorded frequency, are given in Table 2. *C. leucostoma* and *A. ruficrus* are red data book category 3 species. These two species have northern distributions with Yorkshire on their southern boundary. *C. leucostoma* and *C. fasciatellus* are only known in Yorkshire from Strensall Common. Five other species can be regarded as rarities in a Yorkshire context, while ten species can be regarded as local to open sandy habitats (Table 2).

For the Archer sample, the number of solitary species recorded each month and the new species seen each month are given in Table 3. The most productive months were from May until August, although a few species were collected in April and September; May and July were the important months for finding new species, with June and August being much less important. The number of solitary species recorded on each visit varied from one to 11, with ten or more species being recorded on only three days.

The Archer sample of solitary species consisted of 318 records (Table 1) where a record would be a specimen differing in one of the following three variables: name, sex and day of visit. Females were more numerous than males, representing 59.0% of the records, although the sex of three bethyloid species could not be determined.

The seasonal progression of the solitary species may be described as follows: in the first part of April, three species of mining bees, *A. clarkella*, *A. praecox* and *A. ruficrus*, are present with *N. leucophthalma*, the cleptoparasite of *A. clarkella*; late April and May see the presence of eight species of *Andrena* with four species of their cleptoparasitic *Nomada*, the males appearing just before the females or at least becoming more numerous before the females appear in numbers; also during May three species of *Lasioglossum* and *H. rubicundus* with three species of their cleptoparasitic *Sphecodes*

TABLE 2

The number of days on which each species of solitary wasp and bee was recorded at Strensall Common from the Archer sample

No. days	Species	No. species
1	*Elampus panzeri*[2], *Hedychridium ardens*[1,2], *Chrysis angustula*, *C. ruddii*, *Trichrysis cyanea*, *Arachnospila anceps*, *Evagetes crassicornis*, *Ancistrocerus parietinus*, *Symmorphus mutinensis*, *Tachysphex pompiliformis*[2], *Crossocerus wesmaeli*, *C. capitosus*[1], *C. leucostoma*[1], *Ectemnius cephalotes*, *Oxybelus uniglumis*, *Psen equestris*[2], *Passaloecus corniger*, *Andrena nigroaenia*, *A. wilkella*, *Lasioglossum villosulum*[1], *Sphecodes monilicornis*, *Osmia leaiana*, *Megachile centuncularis*, *Nomada fabriciana*, *N. rufipes*.	25
2	*Methocha ichneumonides*[1,2], *Myrmosa atra*, *Calliadurgus fasciatellus*[1], *Priocnemis exaltata*, *Anoplius nigerrimus*, *Odynerus spinipes*, *Crossocerus annulipes*, *Ectemnius lapidarius*, *Passaloecus monilicornis*, *Ammophila sabulosa*[2], *Andrena fulva*, *A. tarsata*[2], *Sphecodes gibbus*, *Coelioxys elongata*, *Nomada panzeri*, *Epeolus cruciger*[2].	16
3	*Chrysis impressa*, *Dipogon subintermedius (= nitidus)*[1], *Priocnemis parvula*, *Arachnospila spissa*, *Trypoxylon clavicerum*, *Crabro peltarius*, *Crossocerus tarsatus*, *Halictus rubicundus*, *Sphecodes fasciatus*, *Osmia rufa*, *Megachile versicolor*.	11
4	*Crossocerus megacephalus*, *Argogorytes mystaceus*.	2
5	*Crossocerus cetratus*, *Andrena ruficrus*[1], *Sphecodes hyalinatus*.	3
6	*Priocnemis perturbator*, *Crabro cribrarius*, *Pemphredon lugubris*, *Colletes succinctus*[2], *Andrena haemorrhoa*, *A. chrysosceles*.	6
7	*Andrena clarkella*, *A. praecox*[2], *Lasioglossum calceatum*.	3
8	*Ectemnius cavifrons*, *Andrena scotica*, *Nomada leucophthalma*.	3
9	*Crossocerus ovalis*, *C. pusillus*.	2
10	*Mellinus arvensis*.	1
11	*Lasioglossum rufitarse*, *Nomada marshamella*.	2
12	*Anoplius viaticus*, *Crossocerus quadrimaculatus*.	2
14	*Lasioglossum fratellum*.	1
15	*Ectemnius continuus*.	1

[1] Rarities in a Yorkshire context.
[2] Local to open sandy habitats.

TABLE 3

The number of species of solitary wasps and bees recorded per month and new species seen each month at Strensall Common from the Archer sample

	April	May	June	July	August	September
No. species	6	32	33	42	27	17
No. new species	6	26	11	24	6	4

appear, but only females are present; early in May the only long-tongue bee is *O. rufa*, and at first just two wasps are present, the spider-hunting wasps, *P. perturbator* and *A. viaticus*, but by the end of May the first sphecoid wasps are beginning to appear.

By early June the spring mining bees of *Andrena* are gone, to be replaced in the summer by *A. chrysosceles* and *A. wilkella*, which in turn are gone by mid-July; further *Lasioglossum* and *Sphecodes* bees appear and will remain until September with the males appearing from the middle of July. In June, but particularly in July, the long wait for the appearance of the sphecoid and pompiloid wasps is over and some of these species will continue into September. The megachilid bees with their cleptoparasitic *Coelioxys* also appear during the summer, as well as the scolioid and eumenid wasps with their parasitic chrysid wasps, although some chrysids were present at the end of May.

From early July until August *C. succinctus* appears as the heather starts to flower, with its cleptoparasite *E. cruciger*. By the middle of July, the appearance of the common wasp, *M. arvensis*, which can be taken as a marker, indicates that most, if not all, of the solitary species have now appeared. However, for some species their populations seem so low that continual searching well into September is likely to turn up new and unusual species.

Cleptoparasitic species, after invading the nest of their host, lay eggs, the larvae of which, on hatching, usually destroy the host's immature stage and eat its food reserves or in the case of the social species use the host's workers to rear further cleptoparasites. The cleptoparasitic load (CL) is the percentage of species that are cleptoparasites (Table 4). In calculating the CL two species have not been included as they are parasitic on non-aculeate species as follows: the bethyloid *C. formiciformis* on beetles of the family Ciidae and *M. ichneumonides* on tiger beetles, *Cicindela*. The CL of the solitary and social wasps are similar as are those of the solitary and social bees but the CL of the wasps is lower than that of the bees (Table 4). The solitary wasp cleptoparasites were the chrysid wasps, the scolioid wasp *M. atra*, the pompiloid wasp *E. crassicornis* and the sphecoid wasp *P. corniger* although this latter species builds its own aerial nest, stealing its prey of aphids from the nests of other *Passaloecus* species (Yeo & Corbet,

TABLE 4

The relative frequency of cleptoparasitic species in the historical and Archer samples from Strensall Common

	No. host species (H)	No. cleptoparasitic species (C)	Cleptoparasitic load (CL)*
Social wasps (Vespidae)	5	1	16.7
Social bees (Apidae)	7	3	30.0
Solitary wasps	41	9	18.0
Solitary bees	26	13	33.3

* $CL = 100 \times C/(H+C)$

1983). The bee cleptoparasites belong to the genera of *Sphecodes*, *Coelioxys*, *Nomada* and *Psithyrus*.

The aerial nester frequency (AF) is the percentage of the host or non-cleptoparasitic species that have aerial nest sites (Table 5). Aerial nests are often in old beetle burrows in dead wood or the central cavities of stems such as those of bramble. Non-aerial nesters nest in the soil, usually in burrows dug by themselves but sometimes in crevices or, in the case of some bumble-bees, in the moss or leaf-litter layers on the soil surface.

TABLE 5

The nesting habits of the host wasps and bees in the historical and Archer samples from Strensall Common

	Aerial nesters (A)	Soil nesters (S)	Aerial nester frequency (AF)*
Social wasps (Vespidae)	1	4	20.0
Social bees (Apidae)	0	7	0.0
Solitary wasps	17	24	41.5
Solitary bees	5	21	19.2

* $AF = 100 \times A/(A+S)$

All social bees are non-aerial nesters as are most social wasps, the only aerial nester being the Norwegian wasp, *D. norwegica*. Just under half of the solitary wasps and about one-fifth of the solitary bees are aerial nesters. The former are mainly sphecoid wasps, particularly *Crossocerus* and *Ectemnius* but also the pompiloid *D. subintermedius* (= *nitidus*) and most of the eumenid wasps. The main solitary bee aerial nesters are most of the megachilid bees of *Osmia* and *Megachile* and the primitive bee *H. communis*, although the latter is a crevice-nester.

Discussion

A site with 100 or more aculeate species may be regarded as an excellent or first-rate site in a Yorkshire context. The grading of a site in terms of the number of species is linked to the geographical locality of that site since an excellent site in a southern county would probably have in excess of 200 aculeate species. A grading based on the quality of the species has not yet been developed, but using the point system of the N.C.C. Invertebrate Site Register would give Strensall Common at least 400 points. Here each of the two Red Data Book species would get 100 points while ten species can be treated as Yorkshire rarities and probably, at least, as regionally notable species, so gaining 20 points each. A score of 200 points is required before a site can be considered as an S.S.S.I.

Archer (1985) divided the species of wasps and bees recorded at Pompocali into two groups, depending on how many days each species was recorded, the 'unusual' group when species were recorded on one, two or three days and the 'common' group recorded on more than three days. Such a division is relevant for the solitary species of the Archer sample (Table 2) with 52 species (66.7%) in the unusual group and 26 species (33.3%) in the common group. This division in percentage terms is very similar for that given by Archer (1985). The large size of the 'unusual' group probably indicates the low number of many solitary aculeate populations and hence the need to spend many hours in the field in order to find them.

Heithaus (1979) collected together the cleptoparasitic loads (CLs) as measured in several studies of bee species populations and showed that the load is relatively constant, with most values between 10% and 13%. The cleptoparasitic load for both the solitary

and social bees is higher (Table 4), as are the CLs for bees at Pompocali (Archer, 1985) and Bernwood Forest (Archer, unpublished), about 10 km north-east of Oxford. The range of the CLs in these three studies is from 14.3% to 30.0% for social bees and from 31.8% to 36.8% for solitary bees. The wider range for the social bees probably reflects the smaller number of species, so random effects are more likely to operate. The narrow range for the solitary bees requires confirmation from further studies before it can be accepted but it agrees with Heithaus (1979) in terms of its constancy. Similarly the CLs from the three sites studied by Archer for the solitary wasps are relatively constant, with values from 12.5% to 18.2%, although the CLs of the social wasps are rather variable and again very few species are involved. Why the CLs should be constant for the solitary species and higher for the bees compared with the wasps is unknown, but indicates the possible importance of the cleptoparasitic factor in determining the structure of wasp and bee assemblages, particularly for the bees.

Haeseler (1985) found that the aerial nester frequency (AF) for solitary wasps in a birch woodland on a sandy site was 74.0%. The lower AF of 41.5% for Strensall Common (Table 5) will be a consequence of a more open area so allowing the ground-nesting species to find sites in sunny situations. The even lower AF of 11.1% at Pompocali (Archer, 1985), an open grass and heather site on sandy soil, is due to an almost total absence of dead wood suitable for nesting. The AF at Bernwood Forest, a woodland site on clay soil, is high again at 70.7% due to the presence of suitable dead wood for nest sites (Archer, unpublished).

For the solitary bees, Haeseler (1985) found an AF of 19.5% which is similar to that for Strensall Common (Table 5). In contrast, the AF for Bernwood Forest is higher at 33.3%; presumably here, with a lack of sandy soil in which it is easier for the soil-nesters to burrow, greater prominence is given to the aerial nesters (Archer, unpublished). Again the AF at Pompocali at 0.0% is due to the lack of suitable dead wood.

At the woody sites of Haeseler (1985), Bernwood Forest and Strensall Common (Table 5) the number of solitary wasp species is greater than that of solitary bee species while at the relatively non-woody site at Pompocali the reverse is the case. Thus not only is the structure of the wasp and bee assemblages influenced by the presence or absence of aerial nesting sites and a clay or sandy soil but also the composition or absolute number of solitary wasp species is greatly influenced by the presence of aerial nesting sites.

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OCCURRENCE OF THE STONEWORT, *NITELLA MUCRONATA* VAR. *GRACILLIMA*, NEW TO NORTHERN BRITAIN, AT COPLEY, NEAR HALIFAX

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During a search for stoneworts in the neighbourhood of Halifax on 18 February 1987, a short stretch of the canal at Copley was among the localities inspected. On this occasion the canal was clear and slow-flowing enough to allow (unusually, judging from the experience of future visits) a view from the southern bank down through *c* 0.7 m depth of water to the shored mud of the bed, here banked up almost level as far as 2 m out from the edge, at which point it dropped sharply towards the darker, deeper middle of the canal. Within a small area (8 m × 2 m) of this roughly level strip of bed alongside the bank, edged here by abutments under a footbridge about 200 m upstream from a railway viaduct, four plants of the stonewort genus, *Nitella*, were sighted, growing erect, isolated and with a thin overall covering of vegetative and other canal detritus, rendering them at first difficult of recognition from the bank. A small collection was made for purposes of laboratory determination and the provision of substantiating material (Fig. 1).

FIGURE 1
Habit of *Nitella mucronata* var. *gracillima*, collected from the canal, Copley, in laboratory cultivation, Leeds.

Examination under dissecting microscope (x 20) revealed the presence of frequent three-celled dactyls and other morphological features indicating that the plant was either *Nitella mucronata* var. *gracillima* or *N. gracilis*, of which latter species the former taxon resembles a robust form. As the material was sterile, a more precise determination appeared impossible. This opinion was confirmed on examination of the material by Dr W. A. Sledge and Mrs J. A. Moore. Regarding the ambiguous appearance of such sterile plants, it is interesting to note the comment of Groves and Bullock-Webster (1917) on their examination of *N. mucronata* var. *gracillima*, sent to them by Miss Ida M. Roper after the first discovery of the plant by her at Wickwar, Gloucestershire, in 1917: 'We were inclined at first to think that it might be a large form of *N. gracilis*. Later specimens with ripe fruit, however, decided the question.' Allen (1950), referring to instances of *N. mucronata* 'having been found in running water, an unusual habitat for charophytes', says of them: 'River specimens, however, are apt to be sterile.'

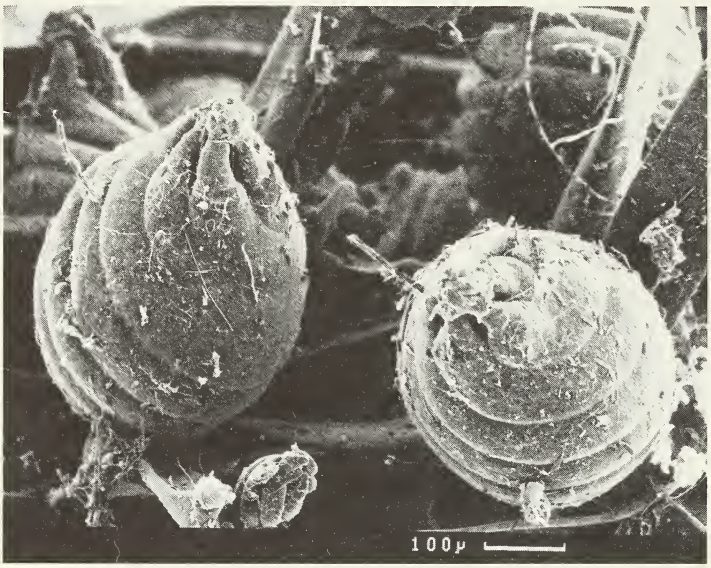

FIGURE 2
Scanning electron micrograph of two oogonia of *Nitella mucronata* var. *gracillima*.

On 14 May 1987, despite adverse weather and attendant visual difficulties, another collection was made in the hope of obtaining fruiting material, but no trace of antheridial or oogonial formation could be detected. Given this continuing sterility of plants *in situ*, it was highly gratifying to discover in early June that a specimen grown on in tap-water (!) in the laboratory at Leeds had fruited and bore numerous orange antheridia and faintly translucent pale green (darkening on maturity to grey-black) oogonia (Fig. 2). Examination of the oogonial membranes speedily established the identity of the plant as *N. mucronata* var. *gracillima*, the reticulate membrane pattern (Fig. 3) easily distinguishing it from *N. gracilis* which has a granular membrane decoration.

Groves and Bullock-Webster (1917) quote Miss Roper's own account of the discovery of *N. mucronata* var. *gracillima* at Wickwar: 'I first noticed the plant on April 30, 1917, growing in a small pond nearly six feet deep of clear land water, situated due east of Rangeworthy, W. Glos. In this district there are many similar ponds of varying depths from which the mineral strontia has been dug at various times within the last 50 years.

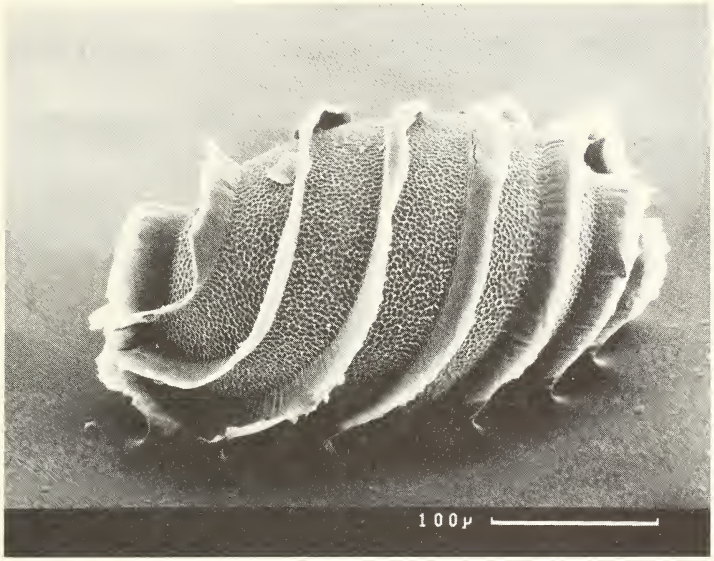

FIGURE 3
Scanning electron micrograph of an oogonium of *Nitella mucronata* var. *gracillima* with the decorated membrane exposed.

The *Nitella* was very abundant in the pond, and the only growth.' The G. R. Bullock-Webster Collection in the University of Leeds Herbarium, presented in July 1933 (Burrell, W. H. 1933), 'a series of sheets of the British Charophyta, an obscure order of submerged aquatics' (letter from G. R. Bullock-Webster to the Registrar, Leeds University, 4 December 1932), contains a sheet (Folder C, No 872/6b) labelled: '*Nitella mucronata* Miquel var. *gracillima* Groves and Bullock-Webster. Wickwar, Gloucestershire, collected June 1917, cultivated until July 1921. *Legit* Miss I. Roper.' The sheet holds two sprays of fruiting shoots, each *c* 4 cm long. A colour lithograph of the taxon by Miss Mary Groves forms the frontispiece to Groves and Bullock-Webster (1920). Writing there of *N. mucronata*, Groves and Bullock-Webster refer to its extreme variability, but add that 'in the British forms there is little difference between the fertile and sterile whorls, so that the growth is uniformly lax'. In the case of our collections of *N. mucronata* var. *gracillima* from Copley, fruiting laboratory-cultivated specimens had much neater, more compact and uniform whorls and were less lax in habit than the plants in the canal.

Opportunity was afforded for a fuller inspection of *in situ* plants at Copley, when repair work near the footbridge necessitated the lowering of the water-level on 2 July 1987. The site was visited while repair work was under way, the water being *c* 1 m lower than normal. Vegetation over a 100 m length of the almost entirely exposed 2 m wide strip of level mudbank by the southern edge was left stranded and easily discernible. On the whole of this strip less than a score of *Nitella* plants were seen, all of them referable to *N. mucronata* var. *gracillima*, all sterile and all growing singly. Occasional plants of an aquatic grass and of a pondweed were almost equally sparsely distributed.

N. mucronata is one of the more transient of charophytes. The singular sparseness of distribution shown by the variety *gracillima* at Copley may be due in part to anthropogenic influences. Traffic through the canal at this point averages three boats per day. A considerable amount and variety of discarded rubbish (prams, milk-crates, oil-drums,

TABLE 1

Nitella mucronata* var. *mucronata

V.C.	Grid Ref.	Date	Expert.	Locality	Habitat
6	31 463394	6.1975	JAM	Street Heath Glastonbury	Peat cutting
8	4125–62–	9.1938		Nr Free Warren Crofton	Canal
11	4136–01–	4.1973	JAM	Hatchet Pond New Forest	
11	40 33–99–	11.1977	JAM	Green Moor New Forest	Pond
13	5103–14	6.1950	GOA	Amberley Wild Brooks	
13	5117–19–	7.1820		West Grinstead Lock	Marsh ditch
14	5151–03–	8.1935	GOA	River Cuckmere Alfriston	
14	517—1—	8.1937	GOA	Powdermill Sedlescombe nr Hastings	Reservoir
17	418 —4—	10.1936	GOA	River Wey nr Frensham	
20	52 445126	8.1956	GOA	Gilston Park	Lake
21	51 312924	9.1986	JAM	New River between Southgate and Wood Green	Disused aqueduct
22	4247–09–	8.1892		North of Godstow nr Oxford	Ditch
23	4248–09–	9.1892	HG	Godstow Nunnery nr Oxford	Ditch
23	4251–05–	10.1972	JAM	Tributary of Thames Oxford	River
26	6205–33–	7.1957		River Stour Dedham	
27	63346257	8.1977	JAM	Tonnage Bridge Dilham	Canal
28	535—1—	7.1897		Little Ouse nr St Johns	River
30	520—4—	10.1882		Water Hole nr Bedford	
30	520—4—	8.1884		River Ouse Bedford	
30	521—4—	.1891		River Ivel nr Sandy	
232	238–0—	8.1901	GBW	South West of Carrickmacross	Pool
232	238–0—	8.1901	GBW	Lough Monalty Carrickmacross	

TABLE 2

Nitella mucronata* var. *gracillima

V.C.	Grid Ref.	Date	Expert.	Locality	Habitat
27	6333–05–	8.1952	GOA	Rockland Broad	
29	52424799	7.1976	JAM	Old Bedford River, Sutton Gault	
29	52436814	7.1976	JAM	Old Bedford River, Mepal	
34	316—8—	6.1917		Nr Rangeworthy	Deep pond
34	3168–86–	3.1918	JG	East of Rangeworthy	Pond
34	317—8—	6.1917		Nr Wickwar	Pond
38	4249–77–	4.1949	GOA	Oxford Canal Newbold-on-Avon	
34	31708855	12.1984	AJB	Yate Court Leech Pool Farm, Yate	Strontia pit
17	51053619	8.1985	JAM	Basingstoke Canal at Byfleet	Disused canal
56	43670832	7.1986	JAM	Chesterfield Canal, nr East Retford	Chesterfield Canal
63	440—2–	2.1987	AH	Copley Canal, nr Halifax	
(Doubtful records)					
27	63105184	8.1977	JAM	Lenwade Water N.R.	Gravel pit
89	37056442	8.1976	JAM	Loch of Lowes, east shore (probably *N. gracilis*)	

rags, etc.) were observed during our visits. Charophyte sensitivity to water chemistry is well attested (see e.g. Kusel-Fetzmann 1986). Measurements of water quality carried out 1 km upstream (with no intervening lock) by Yorkshire Water early in 1987 were as follows: pH 7.7; hardness 69; ammonia 0.52 mg per litre; and nitrate 1.4 mg per litre. Amount of light could be a factor contributing to the continued sterility of the *in situ* stoneworts. On only one (the first) of our visits from February to July did the canal water appear reasonably clear. This reach of the canal has not been cleaned for some years.

Nitella mucronata var. *mucronata* has been recorded in Britain from rivers, canals, a lake, a pool, a pond, ditches, a disused aqueduct and a peat cutting (Table 1); *N. mucronata* var. *gracillima* from rivers, canals, ponds, a strontia pit, and (doubtfully)

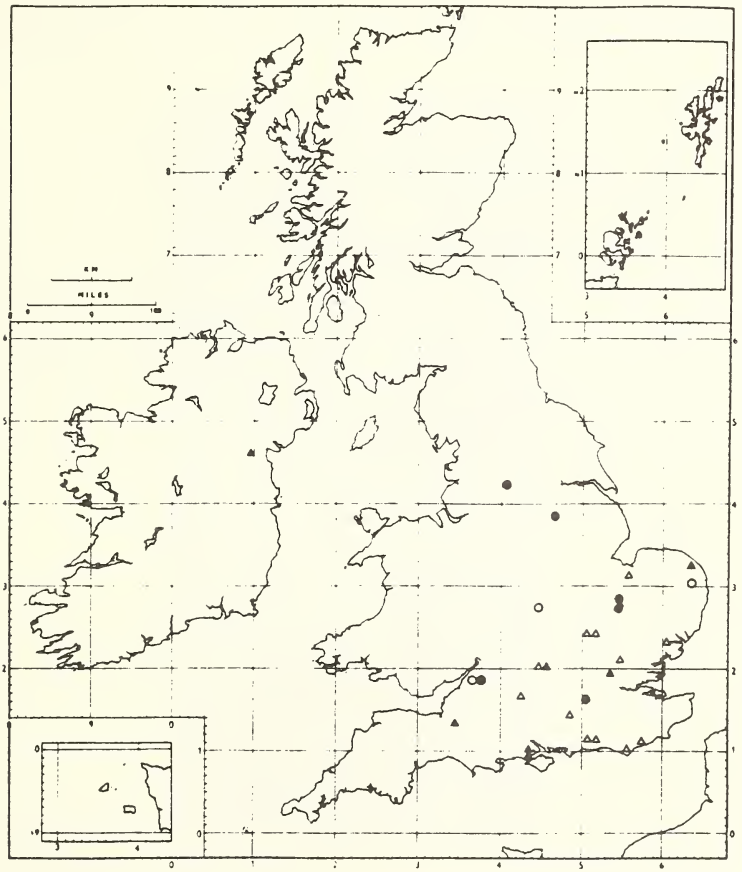

FIGURE 4

The British distribution of *Nitella mucronata* var. *mucronata* and *N. mucronata* var. *gracillima*. Open triangles represent pre-1960, and shaded triangles post-1959 records of *N. mucronata* var. *mucronata*: open circles represent pre-1960, and shaded circles post-1959 records of *N. mucronata* var. *gracillima*.

from a gravel pit (Table 2). Apart from two isolated collections from Co. Monaghan, Ireland, the variety *mucronata* is confined in Britain to southern England. A record of a sterile plant from a nursery tank in York in 1903 (Bailey *et al.* 1975) was listed erroneously. As the tank concerned contained American water-lilies, the *Nitella* was quite probably of foreign provenance (J. A. Moore *in litt.*). Until our find at Copley, the variety *gracillima*, too, was unrecorded from northern Britain. There is a recent dubious record of a sterile plant from Loch of Lowes, Scotland, but this is probably *N. gracilis* (J. A. Moore *in litt.*). The map (Fig. 4) shows the British distribution of both varieties to date.

Acknowledgements

We are most grateful to Mrs J. A. Moore for the use of her data, to Dr W. A. Sledge for helpful discussion, to Mr A. Hick for scanning electron micrography, and to Mr J. H. Miller of British Waterways and Mr P. Illingworth of Yorkshire Water for provision of information.

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WILLIS BRAMLEY

Willis Bramley reached his 90th birthday on 12th November 1987 and celebrated it three days later at a luncheon party for about 50 members of his family and friends. The celebration, organized as a surprise for Willis by his sons, Peter and Christopher, was held at Kirby Misperton. Members of the Bramley family came from as far away as Cornwall. Y.N.U. members present included Beryl and Colin Stephenson and Joyce and Kenneth Payne. Willis is in reasonably good health and was in great form at the luncheon. He does complain, though, that it is more difficult to collect specimens from ground level than it used to be!

Willis will be well known to all older Y.N.U. members but possibly not to younger members whose interests are not in mycology. He was born in 1897, at Fairburn, into a family well known as farmers in that area. It may be worth noting that this is the year (1897) following the Y.N.U. foray based on Selby and the meeting in the Londesborough Arms at which the British Mycological Society was formed and its first officers elected.

Later, Willis lived at Bolton Percy near Tadcaster. He moved to Pickering during the 1950s, after making a favourable assessment of the mycological potential of that area during the several Thornton Dale forays of the Mycological Section.

From his early days, Willis was a fine all-round naturalist, but it was on mycology that he concentrated, initially with encouragement from F. A. Mason. He was elected

to the Mycological Committee in 1921, and his name first appears, together with that of Dr John Grainger, as one of the recorders of fungi at the long weekend forays of the Mycological Committee in 1935; he took over as sole recorder about 1946. Then, through the 30 years until 1975, he compiled for publication the species lists for the spring and autumn meetings. During this time and subsequently he was in touch with many of the leading professional and amateur mycologists in Britain. He himself became one of the best amateur mycologists ever to have worked in the British Isles. Willis has worked at most groups of fungi but does have a particular interest in rusts. Details of some of his finds are mentioned in the standard British text *British Rust Fungi* by Malcolm Wilson and D. M. Henderson (1966).

Fortunately, through the work of Tom and Shirley Preece and a distinguished team of editors, the results of Willis Bramley's many years of recording are available to all who want them. With *A Fungus Flora of Yorkshire* (1985), Yorkshire joined Warwickshire as the only British counties to have a county flora devoted solely to fungi, although it should, perhaps, be noted that in 1986 R. W. G. Dennis had published his fine *Fungi of the Hebrides*, but this was doubtfully a true county flora.

During the birthday celebration luncheon, Willis was presented with an engraved glass goblet as a small token of the esteem of the Mycological Committee. The goblet had been commissioned from Mrs. Olive Gibson and engraved by her with the well known 1787 figure of *Collybia peronata* from James Bolton's *Fungusses growing about Halifax*, together with 'W.G.B. – 90 years' and 'Y.N.U.'.

Kenneth Payne

BOOK REVIEWS

Owls by **Chris Mead.** Pp. 128, with numerous drawings and diagrams by **Guy Troughton**. Whittet Books. 1987. £5.95.

In a style clearly aimed at younger readers and less well informed adults this book nevertheless contains an amazing amount of information relating to owls, especially our own British breeding species, much of it new to me. There are chapters covering every conceivable aspect of the group, some of the more interesting, in my view, being those on owl evolution, the effects of toxic chemicals, the extensive folklore of owls, and a very useful list of works for further reading.

The illustrations by Guy Troughton are extremely competent and include some of the most impressive line illustrations I have seen of owls. Amusing cartoons illustrating points in the text are also very apposite. Altogether a very well balanced introduction to the subject.

MD

A Field Guide to Photographing Birds by **Mike Hill** and **Gordon Langsbury.** Pp. 251, with numerous colour and monochrome illustrations. Collins. 1987. £12.95.

As one would expect from a Collins Field Guide, this one is packed with useful facts and illustrations. It takes the reader step by step through the many aspects of bird photography, showing not only how and where to take the best photographs but when. The text contains great detail without becoming too technical and is illustrated by excellent colour and monochrome photographs; several clear line drawings assist the reader to visualise some of the 'set ups' described.

The first part of the book deals with the technical side of the subject. It advises on the equipment and techniques required, and includes a wealth of information and advice on the many legal and ethical points one must bear in mind when undertaking this kind of task. It also contains advice on the use of the photographs one has taken. The second part is a gazetteer, divided into the six categories of types of terrain and their respective bird populations. It covers most of Europe and contains many useful addresses and directions to sites. The three part index, Species, Technical and Locations, I found very useful.

The authors have succeeded in bringing together the expertise of two complex disciplines, photography and bird-watching, and blending them in such a way as to enable a follower of either to become familiar with the other.

SD

The Cuckoo by **Ian Wyllie**. Pp. 24, with numerous b/w and full-colour illustrations. Shire Natural History Publications. 1987. £1.25.

This is one of the latest publications in the long list of Shire publications intended to fill the gap between brief guides of general interest and full-length books for the specialist. The author has studied the parasitization of Reed Warblers by Cuckoos for some years and was involved in the making of the B.B.C. film 'The Private Life of the Cuckoo'. It fully describes the life history of this species, unique to the breeding avifauna of this country, and with the aid of excellent photographs relates the British bird to the 127 species of the family Cuculidae which inhabit the rest of the world.

MD

Birds in the Sheffield Area. The 1984–5 report of the Sheffield Bird Study Group. Edited by **D. Herringshaw** and **J. Hornbuckle.** Pp. 112, with numerous black and white drawings in the text, a map of the study area with a key to major localities, and arrival and departure dates for summer and winter migrants in the period under review. Sheffield Bird Study Group. 1987.

This review of the status of birds in the Sheffield area fully maintains the comprehens-

iveness, accuracy and quality of production we have come to expect from this energetic group. The main species list, which includes records of some 208 species during 1984 and 1985, includes three new for the region – Great Skua, Richard's Pipit and Arctic Redpoll. Other rarities include Rough-Legged Buzzard, Long-tailed Duck, Temminck's Stint, Avocet, a 'trip' of 27 Dotterel – part of a large-scale influx in 1985, Purple Sandpipers, Long-tailed Skua, Bearded Tit, Hoopoe, Golden Oriole and Marsh Warbler. Notable breeding occurrences were Black-necked Grebe, Red-breasted Merganser, Goosander, Goshawk, Black Redstart (a local speciality) and Peregrine – the latter successfully for the first time. Also included are summaries of special surveys, one of the great strengths of this active society, the Waterways Bird Survey (organised nationally by the B.T.O.), a survey of Summer Wildfowl, a Heron survey (in 1984), and, in 1985, the latest five-yearly census of Rookeries in the area.

The editors and contributors are to be congratulated on this impressive publication.

MD

Collins New Generation Guide: Birds of Britain and Europe, by **Christopher Perrins**. Pp. 320, with colour illustrations throughout. Collins. 1987. Paperback, £6.95.

This is a different kind of bird book. Divided into three sections, the first describes the evolution and anatomy of birds; the second resembles a more 'orthodox' field guide, with illustrations and distribution maps of all species which breed in Europe or visit in reasonable numbers; the third, and largest, section deals with the life and development of birds, including moult, feeding, breeding and migration: all this packed into a book much the same size and volume as a number of the popular field guides, covering identification only, already on the market.

The most successful sections, in my view, are certainly the first and, especially, the third, both rich in up-to-date information essential for the beginner and with something new even for the more experienced birdwatcher – a veritable mine of information.

The middle section, on identification, is very much less successful, and is not helped by having its key tucked away in the endpapers. Due to lack of space inevitable sacrifices have been made especially as it aims to be as comprehensive as a normal field guide. The illustrations, although of good quality, are really too small to show any useful detail, and lack any 'Peterson-type' devices to draw attention to diagnostic features. The accompanying text is cramped and over-abbreviated, at times cluttered by cross-references to more detailed information on specific topics elsewhere in the book. Considering their small size, the distribution maps are surprisingly useful as a general guide to the distribution of the commoner species, but are of little real value for those of more limited occurrence.

A useful book to refer to for facts from time to time, but I'll stick to my other identification guides for use in the field.

MD

Farming and Birds by **Raymond J. O'Connor** and **Michael Shrubb.** Pp. 290, including line drawings and b/w photographs. Cambridge University Press. 1986. £17.50.

This book reviews the effects of agricultural developments on bird populations in Britain. A truly massive amount of data from BTO censuses and surveys is analysed and correlated with new and changing agricultural practices.

Preliminary chapters discuss the historical background of modern farming practices, and farmland bird communities are described in some detail. Such controversial topics as the impact of hedgerow loss, pesticides and game shooting are successfully tackled. Of particular interest to the field naturalist are the case studies of 13 species of farmland birds, ranging from Lapwings and Linnets to Skylarks and Reed Buntings. The impact on these species due to changes in modern farm practices are clearly discussed, and the arguments supported by considerable statistical data.

A final chapter examines the future outlook for farming and birds in Britain. In this the authors conclude that technology has now a greater influence on farming than

national agricultural policy, and that management of farmland is probably more important than habitat losses in terms of bird populations.

Anyone interested in the birds of the British countryside will find something of interest in this book, whilst for anyone undertaking serious studies of farmland birds it will be an essential reference for many years to come.

JKS

British Red Data Books. 2. Insects, edited by **D. B. Shirt**. Pp. 402, with 18 b/w photographs. Conservancy Council. 1987. £10.00.

This book, which deals with the rarest and most threatened British insects, is the product of the co-operation of very many amateur and professional entomologists. It will be the standard reference work for assessing faunal lists and evaluating the conservation of sites in a British context. It is to be updated by occasional bulletins and new editions. The butterflies, moths, dragonflies, grasshoppers, beetles, flies, caddis flies, heteropteran bugs and ants, bees and wasps are covered. An introduction to each group includes the number of species present on the British list and relevant details of identification guides and recording schemes. The species in each of the five Red Data Book categories (endangered, vulnerable, rare, out-of-danger, endemic) are listed, about 1800 species representing nearly 15% of the British list. The aculeate Hymenoptera with over 28% of its species in the Red Data categories seems to be the most threatened group. Insect species not recorded post-1900 or known to have become extinct since 1900 are also listed. The largest part of the book is devoted to recording the available information on endangered and vulnerable species, including distribution, habitat and ecological data. Gaps in this information indicate areas for further research, while the information given will help in the formulation of better conservation management. A selection of 18 habitats of particular importance to Red Data Book species are described with the help of black-and-white photographs. The habitats chosen emphasize in particular the importance of river shingle and coastal cliffs and those habitats containing dead wood. A code for insect collectors, legislation on insect protection from the Wildlife and Countryside Act 1981, useful addresses and an extensive bibliography are also included, so increasing the usefulness of this volume.

MEA

On Wing and Wild Water by **Mike Tomkies.** Pp. 239, many colour photographs. Jonathan Cape. 1987. £11.95.

Mike Tomkies has probably spent more time watching Golden Eagles than any other British naturalist. Readers of his other books, such as *Golden Eagle Years*, will know of Tomkies' passion for these magnificent birds. He has, in the past, been described as a 'Prisoner of the Eagles' – a title he himself confesses is probably true.

In this book the reader will find described not only first-hand observations of eagle behaviour, but glimpses of the family life of the Black-throated Divers, Buzzards and Peregrines which also inhabit the author's own particular part of the Scottish Highlands.

However, after several books about his experiences in this admittedly very beautiful part of Britain, the descriptions of yet more 'Killer-treks' to remote eyries are becoming rather repetitive. Tomkies himself also seems to be feeling the strain, for in these pages his increasing depression becomes ever more apparent. Perhaps for his own sake, and that of his loyal readers, it is time to turn to a fresh subject in a new area. It would be sad indeed if a natural history writer of Tomkies' ability were to fail through over-exposure to the same subject.

As in his other books, *On Wing and Wild Water* is illustrated by the author's own photographs – many, especially those of the eagles, showing very interesting aspects of the birds' behaviour. However, they are not quite up to the very high standard now expected in nature books, although I suspect that the major problem lies in the reproduction and not in Mike Tomkies' photography.

JKS

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THE FLORA AND VEGETATION OF COUNTY DURHAM

BY G. C. GRAHAM

This is the first book in which the flora and vegetation of all parts of the county are systematically described. Previous floras by N. J. Winch (1831) and by J. G. Baker and G. R. Tate (1868) covered both Northumberland and Durham. Both describe the floristics of previous eras and neither covers Durham in any great detail.

The present work is based upon twenty years of detailed field surveys by a dedicated team of recorders. Over 1800 taxa of vascular plants have been included, as well as 474 species of bryophytes and 517 species of lichens. Historical records are also fully covered, having been extracted from 23 herbaria as well as the relevant literature. A full bibliography is appended. First and early records, phytogeographical niche, habitat and distribution notes are given for each species. Over 800 tetrad distribution maps are incorporated in the text, based on records made between 1968 and 1986.

There is substantial section on the vegetational types found in the county. The latter descriptions are modelled on those of the National Vegetation Classification project, with which the author has been closely associated. 960 individual site descriptions (relevés) are summarised in this section.

The volume has 526 pages, is 306mm × 217 mm × 43 mm and weighs over 2.5 kg. The cost is £30.00 and £2.75 postage and packing (more for overseas) – cash with order. It can be obtained from either the author (The Vicarage, Hunwick, Crook, Co. Durham DL15 OJU) or Mrs. M. Burnip (38 Langholm Crescent, Darlington, Co. Durham DL3 7SX).

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Some Trichopteran larvae of Mid and Upper Wharfedale — *M. Andrews*

Richard Henry Meade: arachnologist, entomologist and surgeon — *R. A. Baker and R. A. Bayliss*

A year-long survey of the bees (Hymenoptera: Apoidea) along the Dean River at Woodford, Cheshire — *James B. Whitfield and Sydney A. Cameron*

Ground nesting by Long-eared Owls (*Asio otus*) on restocked sites in upland forests — *S. J. Petty and D. I. K. Anderson*

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

Photographic Plates

Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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Manuscripts (two copies if possible), typed double-spaced on one side of the paper only with margins at top and left-hand at least 2.5 cm wide, should be submitted. Latin names of genera and species, but nothing else, should be underlined. S.I. Units should be used wherever possible. Authors must ensure that their references are accurately cited, and that the titles of the journals are correctly abbreviated. Volumes of *The Naturalist* for the years 1886 to 1975 have been retrospectively numbered 11 to 100 to accord with numbering before and after this period (see YNU *Bulletin* no. 3, pp. 21–22, 1985); please cite these volume numbers in all references. Tables and text-figures should be prepared on separate sheets of paper. Drawings and graphs, drawn about twice the linear size they are to appear, should be in jet-black Indian ink, and legends should not be written on the figures.

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SOME TRICHOPTERAN LARVAE OF MID AND UPPER WHARFEDALE

M. ANDREWS
26 Margerison Road, Ilkley, W. Yorks LS29 8QU

SUMMARY
Records of Trichopteran larvae collected in mid and upper Wharfedale are presented, with comments on species of particular interest. The variation in the pH of the water of moorland streams is noted, possible causes are suggested, and the zonation of certain species of Trichoptera in relation to pH is demonstrated.

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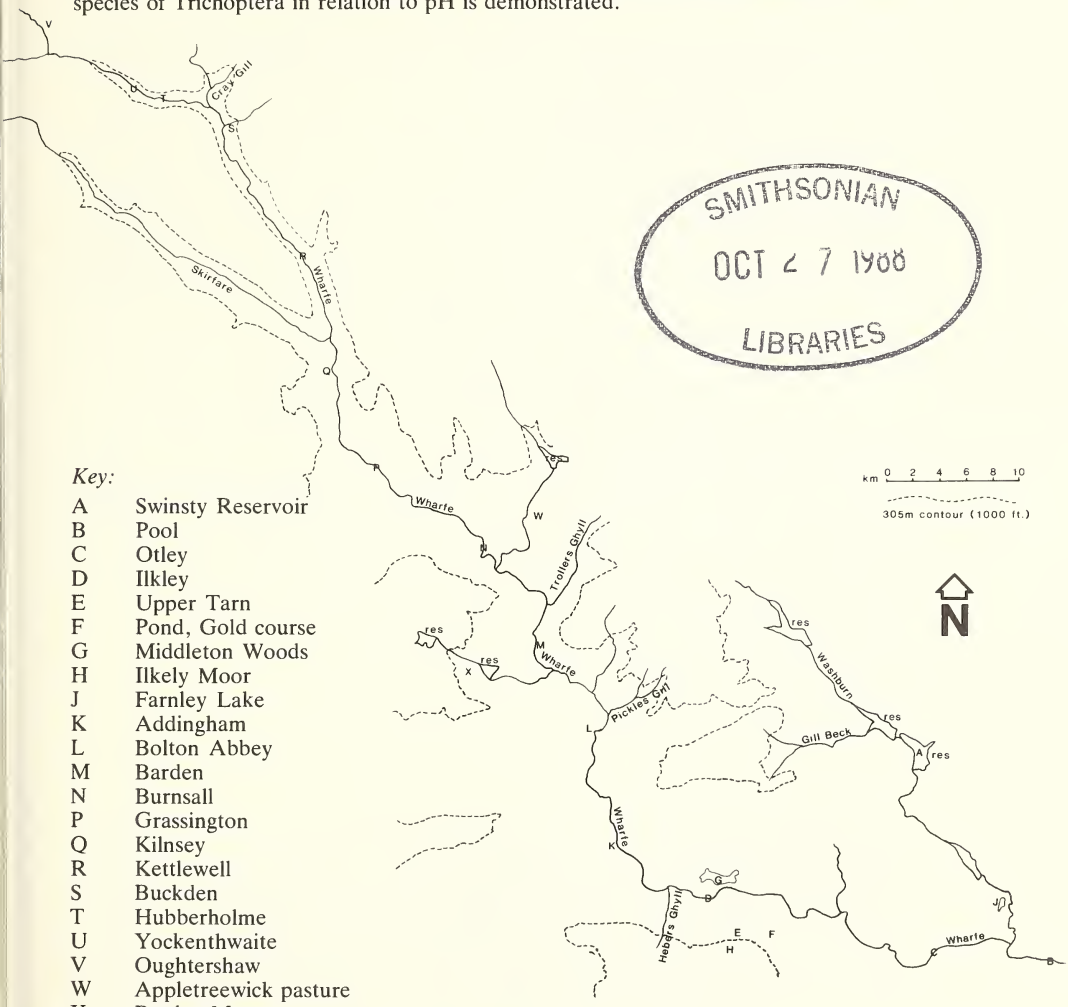

FIGURE 1
Map of Mid and Upper Wharfedale based on 1:50,000 O.S. maps.

The area studied is the valley of the River Wharfe from its source near Oughtershaw to Pool Bridge, rising to the watershed on both sides (Fig. 1). The Wharfe is a clean Yorkshire river which rises in the Carboniferous limestone of the Pennines. It flows through limestone country for about 40 km till it reaches the vicinity of Burnsall. It then flows over millstone grit for the remaining 30 km of the study area.

In upper Wharfedale, above the farmland of the valley bottom, the slopes of the hills support limestone grassland and some woodland. Some of the hilltops are overlain by peat, and in these areas, of which Fleet Moss is an example, the vegetation is grass moor with deersedge, *Trichophorum caespitosum* and the mosses *Polytrichum* and *Sphagnum*.

The slopes of the millstone grit fells of mid-Wharfedale support an acid moorland vegetation of heather *Calluna vulgaris*, crowberry *Empetrum nigrum,* bracken *Pteridium aquilinum*, bilberry *Vaccinium myrtilus*, and matgrass *Nardus stricta*. Wet cotton grass, *Eriophorum*, moors or mosses occur on some hilltops.

The River Wharfe is liable to flood, rising rapidly in times of storm and after snow. It is slightly alkaline, in spite of receiving some tributaries which rise on acid moors, and which are themselves acidic at least in the upper reaches. From the source to about Hubberholme, the R. Wharfe could be considered a torrent, at times pouring down rapids and waterfalls, and not unlike its tributary, the Cray Beck, which enters the river at Hubberholme. Yet in summer parts of the Upper Wharfe are intermittent. Lower down, for instance at Hebden, 1½ km above Burnsall, floods occur near the suspension bridge in some winters, whilst in summer it may be possible to cross the river at the stepping stones. The beds of the river and its tributaries are stony.

TABLE 1
Results of chemical analysis in parts per million

	Grassington			Pool			
	1926–7		1986	1926–7		1986	1987
	Max	Min		Max	Min		
Cl^- ($mg.l^{-1}$)	15.2	6.1	7.2	15.0	9.1	12.0	23.0
NO_3^- nitrogen ($mg.l^{-1}$)	0.5	trace	0.40	0.7	trace	0.91	1.7
Alkalinity (largely HCO_3^-) (m eq l^{-1})	3.6	1.6	1.6	2.7	1.0	2.2	2.6

Porritt (1897) noted that *Allogamus auricollis* had been found by R. McLachlan on 24th September 1893 in myriads all the way from Ilkley to Bolton Abbey, Wharfedale. A biological study of the river was carried out between June 1926 and November 1927 (Pearsall *et al.* 1930). At four stations, invertebrates were collected and monthly samples of water taken. Chemical analyses of the samples of water showed great variation in the concentration of substances for which tests were made. For the purpose of comparison, samples of water were taken in August 1986 at two of the stations, Grassington and Pool. The water was analysed and from the results, it was possible to make comparisons for chloride, NO_3 nitrogen and alkalinity. The results are shown in Table 1.

For both stations the 1986 analyses for chloride and alkalinity fall within the range of variation noted in the 1926–7 study, as also did the level of nitrate nitrogen at

Grassington. The 1986 figure for nitrate nitrogen at Pool shows that some eutrophication has occurred there. (An analysis for Pool by the Freshwater Biological Association in 1987 is added.)

A list of the Yorkshire Trichoptera, enumerating the known localities for each species, was given by Brown and Whitehead (1938). This includes some records for the area under consideration.

The aim of the present study was to collect, identify, rear and record the larvae of as many species of Trichoptera as possible. Specimens were collected from the rivers Wharfe, Washburn and Skirfare, from their tributaries, from trickles on hillsides, small peaty pools, and very small temporary moorland pools. Surface water was examined. A small tarn on Ilkley moor, a pond on Ben Rhydding golf course, two reservoirs and a lake were also sampled. *Sphagnum* was brought home and examined microscopically. Special attention was paid to the Black Beck, which rises on Ilkley Moor.

It became clear that a systematic search in a small area each year would be the best procedure, so each year a new 10 km square based on a 1:25,000 O.S. map was investigated as fully as possible, though collecting continued at other sites when opportune.

Most of the larvae were collected by hand. Stones and the underlying sand or gravel were examined for larvae and pupae. Samples of moss and water-weed were brought home and examined for the presence of caseless caddis larvae, for very small cased larvae, e.g. *Beraea* and members of the Hydroptilidae, and for early instars of all species.

An attempt was made to identify the larvae to species, using the keys and descriptions in Bray (1967), Edington and Hildrew (1981), Garside (1979), Hickin (1967), Hiley (1972, 1976), Leader (1968), Wallace (1977, 1980, 1981) and Wiberg (1979, 1980). To identify the adults which emerged in captivity, keys by Macan and Worthington (1973) and Marshall (1978) were used.

Each cased larva was extracted, anaesthetized in soda water, as described by Bray (1967), examined and then returned to the case and placed in a lightly aerated aquarium. Caseless larvae were similarly anaesthetized for examination. Records were kept of places visited, larvae collected, and details of adult emergence. Aquaria were numbered and accompanied by identity cards showing date and place of origin of contents and subsequent relevant information. The aquaria were not stirred.

Most larvae thrived on a diet of wheat seed and dead tree leaves, but two carnivorous species, *Phryganea bipunctata* and *Agrypnia varia* were hand fed with minute nymphs of stoneflies (Plecoptera) and mayflies (Ephemoptera), which are abundant. Caseless larvae, e.g. *Rhyacophila*, *Plectrocnemia*, *Polycentropus* and hydropsychids could only be reared to the adult stage if they were full grown when collected. Therefore pupae of these were collected, and they frequently emerged as adults. Many caseless larvae can be identified to species, but some, e.g. *Wormaldia* cannot. Nor have I found pupae of *Wormaldia*, so identification of this genus is tentative.

Shelter builders *Agapetus* and *Glossosoma* occur in thousands on stones in the River Wharfe and some tributaries. *Agapetus* larvae will occasionally breed out to the adult stage, but not *Glossosoma*. Pupae of these genera may sometimes breed out in aquaria. *Glossosoma* larvae are said to move into deeper water to pupate (Hynes 1970) and their pupae certainly are more difficult to find than those of *Agapetus*. At present there is no reliable key to the larvae of the Glossosomatidae, and there is no key to the species of larvae of the Hydroptilidae. Of this family, *Agraylea* and *Hydroptila* will emerge as adults in an aquarium, and can then be identified to species, but *Ithytrichia* does not. However, it would be very surprising if the specimens collected did not prove to be *I. lamellaris* Eaton.

Only one member of the Psychomyidae was collected, *Psychomyia pusilla*, one specimen only, although members of this family are known to be abundant in the River Wharfe (Y.W.A. records). Inadequate collecting technique for members of this family probably accounts for their absence from my records.

As a means of classifying, defining and describing the aquatic environments in which larvae have been found, the following scheme is proposed:

1. Rivers, streams and gills (or ghylls) are marked on the 1:25,000 O.S. maps.
2. A torrent is a stream with waterfalls.
3. Trickles and ditches are not marked on the map. (A ditch is man-made, a trickle occurs naturally.)
4. Surface water is not channelled.
5. A tarn is an upland pond or small lake.
6. A lake is more than 0.4 hectare in area.
7. A pool is less than 2 m across.
8. A very small pool is about 60 cm x 30 cm.

The Upper Tarn at Ilkley is about 2000 m^2 and very shallow. It has a dense vegetation of amphibious pondweed *Potamogeton polygonifolius*, milfoil *Myriophyllum*, and starwort *Callitriche*, with horsetails *Equisetum palustre* along one side, and an *Eriophorum* swamp at one end. The golf course pond is about 3000 m^2 and deeper than the tarn, and has much less floating vegetation. There are yellow flags *Iris pseudacorus* and reeds near the edges. One caddis species in the golf course pond, *Melampophylax mucoreus* is described as being commonest in alkaline waters (Wallace 1980). As the water of the pond and the tarn might have been expected to be acid, the hydrogen ion concentrations of both were taken. Both are neutral, at about pH 7.

The water of the Black Beck was also tested. This stream rises on Heber Moss on Ilkley Moor, at an altitude of about 350 m O.D. in a cotton grass area. It crosses an area dominated by *P. aquilinum*, *E. nigrum* and *N. stricta*. At an altitude of about 260 m O.D. it enters a very steep area of mixed woodland known as Heber's Ghyll Wood. At the bottom of the wood, at 160 m O.D., the ghyll flows under Grove Road

TABLE 2
Trichopteran larvae found in Heber's Ghyll

pH	4.5	5.0	5.5	6.5	7.0
Habitat	Cotton grass moor	Bracken & crowberry moor	Top of mixed woods	Middle of mixed woods	Bottom of mixed woods
Limnephilus coenosus	+				
Halesus digitatus		+		+	
H. radiatus		+			
Potamophylax cingulatus		+	+	+	+
Chaetopteryx villosa			+	+	+
Rhyacophyla obliterata				+	
Potamophylax latipennis				+	
Anabolia nervosa					+
Silo pallipes					+
Lepidostoma hirtum					+
Polycentropus flavomaculatus					+
Plectrocnemia geniculata					+

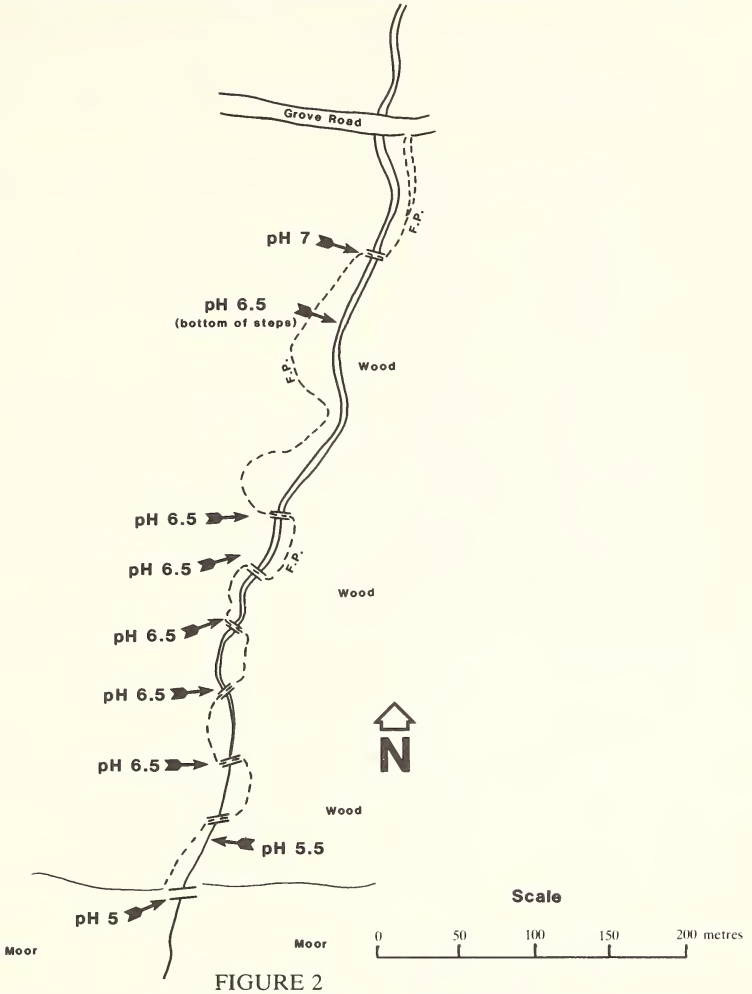

FIGURE 2

Map based on the 25″ to 1 ml. O.S. map showing the part of Black Beck flowing through Heber's Ghyll Woods. The increase in pH of the water with decreasing altitude in a distance of 400m. is indicated.

and on through the urban area to the River Wharfe. Near the source of the Black Beck, the water is acid (pH 4.5), but at the bottom of Heber's Ghyll the water is neutral in reaction. Thus on the moor, in a distance of about 600 m and in a fall of 90 m, the pH of the water changed from 4.5 to 5. And in the woods, in a distance of about 400 m and a fall of 100 m, the pH changed from 5.5 to 7 (Fig. 2).

An attempt was therefore made to record the incidence of Trichopteran larvae relative to the pH of the water. The results are shown in Table 2. From these records, it is reasonable to assume that within Heber's Ghyll, the increase in number of species with decreasing altitude is related to the increasing pH of the water. This could be either a direct relationship, or via some other factor such as the presence of food organisms,

e.g. algae, fungi, bacteria and small invertebrates that thrive at the bottom of the ghyll. More detailed investigation of the invertebrate fauna of Heber's Ghyll would probably prove very interesting.

Factors contributing to the increase in pH of the Black Beck as it descends through Heber's Ghyll, may be:

1. The presence of fossiliferous or calcareous bands in three streams on the moor, Black Beck, Spicey Gill and Backstone Beck.
2. The presence of limestone erratics.
3. The presence of glacial drift containing calcareous material.
4. The effect of spring water flowing into the streams.
5. The effects of vegetation.

Spicey Gill and Backstone Beck rise on Ilkley Moor, east of Black Beck. In Spicey Gill, a marine band about 5 cm thick has been located (Lamming 1969) consisting of bullions containing fossil goniatites. In Backstone Beck there is at least one fossiliferous limestone band (Stephens *et al* 1942). The marine band in Spicey Gill occurs at SE 110467 (Lamming 1969) at an altitude of 240 m. The pH of the water was taken above and below this point, showing pH 4 above the marine band (alt. 300 m) and pH 6.5 below it (alt. 210 m). The marine band therefore evidently causes a decrease in acidity of the water of Spicey Gill. A comparable increase in pH with decreasing altitude was also noted in Backstone Beck (Fig. 3).

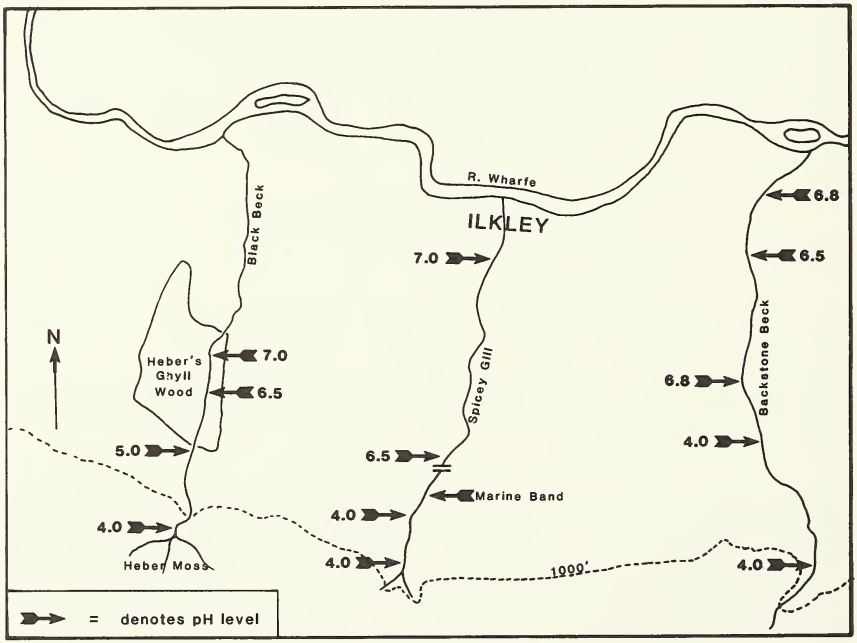

FIGURE 3

Map based on 1:25,000 O.S. map showing 3 streams rising on Ilkley Moor. The pH increases with decreasing altitude.

TABLE 3
Records of Trichtopteran larvae and pupae (*) collected

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Rhyacophila dorsalis (Curtis 1834)			
Aug 79	SD 968 723	225	Kettlewell	Yes	Pasture	R. Wharfe
1980	SE 033 612	140	Burnsall		Pasture	R. Wharfe
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
1980	SE 244 454	45	Pool		Pasture	R. Wharfe
4.viii.82	SE 077 553	120	Bolton Abbey	15.viii.82	Pasture	R. Wharfe
14.vii.82	SE 046 602	130	Appletreewick		Pasture	R. Wharfe
4.vii.83	SE 116 482	90	Ilkley		Park	R. Wharfe
13.vii.83	SE 033 612	140	Burnsall		Pasture	R. Wharfe
22.vi.84	SD 935 785	250	Hubberholme		Wooded valley	Cray Gill, a torrent
30.v.86	SE 026 624	150	Burnsall		Woods	R. Wharfe
8.ix.86*	SD 903 792	260	Yockenthwaite	19.ix.86	Limestone pasture	R. Wharfe
30.vi.87	SD 93 72	225	Arncliffe		Limestone pasture	R. Skirfare
			Rhyacophila septentrionis McLachlan 1865			
28.viii.79	SE 122 485	90	Ilkley	Yes	Pasture	R. Wharfe
1979	SD 900 794	260	Yockenthwaite		Limestone pasture	R. Wharfe
1980	SD 968 723	225	Kettlewell		Pasture	R. Wharfe
1980	SE 046 602	130	Appletreewick		Pasture	R. Wharfe
1980	SE 244 454	45	Pool		Pasture	R. Wharfe
			Rhyacophila obliterata McLachlan 1865			
19.viii.82*	SD 986 662	190	Grassington	21.viii.82	Pasture	Ditch
22.vi.85	SE 099 472	150	Ilkley		Wooded valley	Heber's Ghyll, a torrent
30.vi.87	SD 93 72	225	Arncliffe		Limestone pasture	R. Skirfare
			Rhyacophila munda McLachlan 1862			
1.vi.80	SE 116 482	90	Ilkley	Yes	Park	R. Wharfe
17.ii.85	SE 027 619	150	Hebden		Woods	R.Wharfe
8.ix.86*	SD 903 792	250	Yockenthwaite	20.ix.86	Limestone pasture	R. Wharfe
			Glossosoma boltoni Curtis			
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
1980	SE 078 565	300	Bolton Abbey		Pasture	Torrent in Valley of Desolation
14.vii.82	SE 046 602	130	Appletreewick		Pasture	R. Wharfe
29.vii.83	SE 133 612	140	Burnsall		Pasture	R. Wharfe
18.x.85	SD 996 640	180	Grassington	28.iii.86	Pasture	R. Wharfe
			Glossosoma conformis Nebuiss			
17.ii.85	SE 026 624	150	Hebden		Wooded bank	R. Wharfe
19.v.86	SD 938 774	250	Buckden		Pasture	R. Wharfe
			Agapetus delicatulus McLachlan			
16.viii.79	SE 141 486	100	Denton	6.ix.79	Grassland	Narrow stream
1980	SD 943 793	400	Buckden Cray Bridge		Pasture	Mtn stream
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
1980	SE 122 485	90	Ilkley		Grassland	R. Wharfe
14.ii.82	SE 046 602	130	Appletreewick		Pasture	R. Wharfe
8.v.85	SE 122 485	90	Ilkley		Woods	Ditch
19.v.86	SD 938 774	250	Buckden		Pasture	R. Wharfe
			Agapetus fuscipes Curtis			
24.iii.84	SD 985 650	180	Grassington		Woods	R. Wharfe

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Ithytrichia Eaton			
9.x.78	SE 070 532	110	Bolton Bridge		Pasture	R. Wharfe, in moss
22.ix.78	SE 033 613	140	Burnsall		Pasture	R. Wharfe
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
29.vii.83	SE 033 613	140	Burnsall		Pasture	R. Wharfe
13.xi.83	SD 985 650	180	Grassington		Woods	R. Wharfe
16.ii.85	SE 026 624	150	Hebden		Pasture	R. Wharfe
16.ii.85	SE 052 575	130	Barden		Steep wooded bank	R. Wharfe
			Hydroptila forcipata (Eaton)			
1980	SD 968 723	225	Kettlewell	Yes	Pasture	R. Wharfe
19.ix.86	SE 026 624	150	Hebden	28.ix.86	Pasture	R. Wharfe
			Hydroptila tineoides Dalman			
2.v.80	SE 033 612	140	Burnsall	Yes	Pasture	R. Wharfe
			Agraylea multipunctata Curtis			
6.ix.80	SE 119 467	230	Ilkley	30.vii.81	Heather moor	Moss in tarn
11.xii.85	SE 135 469	200	Ilkley	19.iv.86	Golf course	Pond
			Philopotamus montanus (Donovan)			
18.iv.83	SE 085 555	130	Bolton Abbey		Pasture under big tree	Pickles Ghyll
			Wormaldia subnigra McLachlan			
12.ii.86	SE 080 552	130	Bolton Abbey		Steep wooded hillside	Trickle over tufa
			Diplectrona felix McLachlan 1878			
1980	SE 033 612	140	Burnsall		Pasture	R. Wharfe
27.v.82*	SE 122 485	100	Ilkley	27.v.82	Woods	Ditch
5.iii.85	SE 122 485	100	Ilkley	23.v.85	Woods	Ditch
17.ii.86	SE 077 555	120	Bolton Abbey		Steep wooded hillside	A trickle
14.iii.86	SE 122 485	100	Ilkley		Woods	Ditch
19.v.86	SD 934 784	250	Hubberholme		Wooded valley	Cray Gill a torrent
28.i.87	SD 93 72	225	Arncliffe		Limestone past	Cowside Beck
			Hydropsyche angustipennis Curtis 1834			
31.v.85	SD 935 785	250	Hubberholme		Wooded valley	Cray Gill
			Hydropsyche fulvipes (Curtis 1834)			
1980	SE 046 622	130	Appletreewick		Pasture	R. Wharfe
1980	SE 122 485	90	Ilkley		Grassland	R. Wharfe
22.vi.84	SD 935 785	250	Hubberholme		Wooded valley	Cray Gill a torrent
			Hydropsyche instabilis (Curtis 1834)			
1980	SE 033 612	140	Burnsall		Pasture	R. Wharfe
			Hydropsyche pellucidula (Curtis 1834)			
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
1980	SE 244 454	45	Pool		Pasture	R. Wharfe
13.xi.83	SD 985 650	180	Grassington		Woods	R. Wharfe
19.viii.84	SE 207 461	50	Otley		Park	R. Wharfe
22.ii.85	SE 083 461	100	Addingham		Pasture	R. Wharfe
19.iv.86	SD 938 774	250	Buckden		Pasture	R. Wharfe
30.v.86	SE 026 624	150	Burnsall		Pasture on limestone	R. Wharfe a torrent

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Hydropsyche siltalai Döhler 1963			
19.ix.78	SE 075 582	120	Bolton Abbey		Pasture	R. Wharfe
1980	SD 968 723	225	Kettlewell		Pasture	R. Wharfe
14.vii.81	SE 046 622	160	Appletreewick		Pasture	R. Wharfe
June '82	SE 083 498	100	Addingham	2.viii.82	Pasture	R. Wharfe
3.ii.83	SE 080 552	130	Bolton Abbey		Steep hillside	Trickle
3.vii.83	SE 116 482	90	Ilkley		Park	R. Wharfe
29.vii.83	SE 033 612	140	Burnsall		Pasture	R. Wharfe
6.viii.83	SE 083 495	100	Addingham		Pasture	R. Wharfe
22.vi.84	SD 935 785	250	Hubberholme		Wooded valley	Cray Gill a torrent
17.ii.85	SE 027 619	150	Hebden		Wooded area	R. Wharfe
19.v.86	SD 934 784	250	Hubberholme	22.vii.86	Wooded valley	Cray Gill
29.iv.87	SE 244 484	45	Pool		Pasture	R. Wharfe
			Plectrocnemia conspersa (Curtis 1834)			
14.x.83	SE 082 578	300	Bolton Abbey		Heather moor	Stream
6.vii.84	SE 054 652	270	Hebden	20.vii.84	Grass moor	Blea Gill a stream
2.v.85	SE 18 51	140	Otley		Pasture, wooded bank	R. Washburn
8.v.85	SE 122 485	100	Ilkley		Woods	Ditch
16.iii.86	SE 122 485	100	Ilkley	14.v.86	Woods	Ditch
19.iii.86	SE 144 479	100	Ilkley		Old gravel pit	Pond
			Plectrocnemia geniculata McLachlan 1871			
22.vi.85	SE 099 472	150	Ilkley		Woods	Heber's Ghyll a torrent
16.vi.86	SD 903 792	260	Yockenthwaite		Limestone pasture	R. Wharfe
			Polycentropus flavomaculatus (Pictet 1834)			
1982	SE 108 465	280	Ilkley	Yes	Heather moor	Stream
18.iv.82	SE 099 472	155	Ilkley	24.viii.82	Woods	Heber's Ghyll
9.iv.83	SE 077 566	300	Bolton Abbey	22.vii.83	Wooded valley	Torrent
6.viii.83	SE 083 459	100	Addingham	26.vii.83	Pasture	R. Wharfe
13.vii.83	SE 033 612	140	Burnsall	8.viii.83	Pasture	R. Wharfe
22.vi.84	SD 935 785	250	Hubberholme		Wooded valley	Torrent
19.viii.84	SE 207 461	50	Otley		Park	R. Wharfe
3.iv.83	SE 119 467	230	Ilkley		Heather moor	Tarn
2.v.85	SE 135 469	200	Ben Rhydding	25.v.85	Golf course	Pond
2.v.85	SE 18 51	140	Otley		Pasture, wooded bank	R. Washburn
			Polycentropus kingi McLachlan 1881			
2.iv.86	SD 869 815	320	Oughtershaw		Pasture	Ditch with spring
2.iv.86	SD 869 815	320	Oughtershaw		Pasture	R. Wharfe
			Holocentropus piciornis (Stephens 1836)			
4.v.87	SE 22 47	80	Otley		Decid. wood	Farnley Lake
			Psychomyia pusilla F. 1781			
13.xi.83	SD 985 650	180	Grassington	8.viii.84	Woods	R. Wharfe
			Agrypnia varia (F.)			
21.v.85	SE 135 469	200	Ben Rhydding		Golf course	Pond
11.xii.85	SE 135 469	200	Ben Rhydding	2.vi.86	Golf course	Pond
			Phryganea bipunctata Retzius			
11.xii.86	SE 135 469	200	Ben Rhydding	14.vi.86	Golf course	Pond

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Drusus annulatus (Stephens)			
1980	SE 141 493	100	Asquith		Road verge	Stream
1980	SD 975 785	200	Kilnsey		Grass verge	Stream
Sept 1980	SE 196 508	30	Otley	Nov 1980	Pasture	R. Washburn
June 1981	SE 18 51	170	Otley		Wooded banks	R. Washburn
26.iii.83	SD 934 785	250	Hubberholme		Wooded valley	Cray Gill
7.viii.85	SE 195 524	100	Otley	10.x.85	Wooded banks	R. Washburn
8.ix.86*	SD 903 792	260	Yockenthwaite	19.ix.86	Limestone pasture	R. Wharfe
29.iv.87	SE 244 454	45	Pool		Pasture	R. Wharfe
			Limnephilus auricula Curtis			
1980	SE 033 612	140	Burnsall	Yes	Pasture	R. Wharfe
8.vi.83*	SE 036 564	226	Barden	Yes	Heather moor	Surface water
			Limnephilus centralis Curtis			
4.xi.83	SE 036 564	230	Barden	9.vi.84	Heather moor	Trickle
13.xi.83	SD 985 650	180	Grassington	19.vi.84	Woods	R. Wharfe
5.iii.84	SE 057 626	300	Appletreewick Pasture	5.v.84	Very wet pasture	Pool
15.iii.84	SE 099 469	260	Ilkley	18.vi.84	Wet moor with rushes (*Juncus*)	Trickles
16.iii.84	SE 017 658	350	Grassington	19.vi.84	Wet grass moor	Small pool
19.iii.84	SE 119 467	230	Ilkley	13.vii.84	Heather moor	Bog moss (*Sphagnum*)
11.i.85	SE 1 4	100	Ilkley	21.v.85	Bog	*Sphagnum*
21.v.85	SE 135 469	200	Ben Rhydding	28.vi.85	Golf course	Pond
2.v.85	SE 1 5	120	Otley	20.v.85	Grassland	Streams
1.v.86	SD 858 836	600	Fleet Moss	29.v.86	Moor on limestone	Ditch
			Limnephilus coenosus Curtis			
26.v.82	SE 097 565	325	Ilkley	2.xi.82	Cotton grass moor (*Eriophorum*)	Very small pools
16.iii.84	SE 017 658	350	Grassington	23.viii.84	Wet grass moor	Peaty pools
			Limnephilus flavicornis (F.)			
1980	SE 119 467	230	Ilkley		Heather moor	Tarn
1980	SE 244 454	45	Pool		Pasture	R. Wharfe
30.i.85	SE 135 469	200	Ben Rhydding	18.vi.85	Golf course	Pond
4.v.87	SE 22 47	80	Otley	16.vi.87	Decid. wood	Farnley Lake
			Limnephilus griseus (L.)			
2.v.85	SE 194 532	140	Otley	15.v.85	Grassland	Swinsty Reservoir
			Limnephilus lunatus Curtis			
19.iii.84	SE 119 467	230	Ilkley	18.vii.84	Heather moor	Tarn
2.v.85	SE 194 529	140	Otley	14.vii.85	Grassland	Reservoir
21.v.85	SE 135 469	200	Ben Rhydding	11.viii.85	Golf course	Pond
1.iii.85	SE 244 455	45	Pool	17.viii.85	Meadow	R. Wharfe
22.ii.86	SD 975 678	200	Kilnsey	5.vi.85	Grass verge	Stream
4.v.87	SE 22 47	80	Otley	2.vii.87	Decid. wood	Farnley Lake
			Limnephilus luridus Curtis			
12.iii.85	SE 063 621	300	Appletreewick Pasture	18.v.85	Wet pasture	Ditch with *Juncus*
			Limnephilus marmoratus Curtis			
4.v.87	SE 22 47	80	Otley		Decid. wood	Farnley Lake

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Limnephilus politus McLachlan			
1980	SD 900 794	260	Yockenthwaite		Pasture	R. Wharfe
			Limnephilus sparsus Curtis			
12.iii.84	SE 063 621	300	Appletreewick Pasture		Wet pasture	Pool
12.iii.85	SE 063 621	300	Appletreewick Pasture	19.v.85	Wet pasture	Pool
			Limnephilus vittatus (F.)			
1980	SD 968 723	225	Kettlewell		Pasture	R. Wharfe
26.iii.83	SD 900 794	260	Yockenthwaite	Yes	Limestone pasture	R. Wharfe
2.v.85	SE 194 532	140	Otley	30.v.85	Grassland	Reservoir
21.v.85	SE 135 469	200	Ben Rhydding	29.v.85	Golf course	Pond
4.v.87	SE 22 47	80	Otley		Decid. wood	Farnley Lake
8.v.87	SE 21 48	90	Otley	25.vi.87	Grassland	Lindley Res.
			Anabolia nervosa (Curtis)			
24.v.78	SE 077 553	120	Bolton Abbey	Nov 1978	Pasture	R. Wharfe
22.v.78	SE 244 454	45	Pool		Pasture	R. Wharfe
1980	SD 968 723	225	Kettlewell		Pasture	R. Wharfe
1980	SE 114 483	90	Ilkley		Grass	R. Wharfe
8.ii.81	SE 119 467	230	Ilkley		Heather moor	Tarn
19.iii.84	SE 119 467	230	Ilkley	20.vii.84	Heather moor	Tarn
16.ii.85	SE 052 575	130	Barden	Sept 1985	Steep bank	R. Wharfe
2.iv.86	SD 869 815	320	Oughtershaw		Pasture	R. Wharfe
4.v.87	SE 22 47	80	Otley		Decid. wood	Farnley Lake
8.v.87	SE 21 48	90	Otley		Grassland	Lindley Res.
			Potamophylax cingulatus (Stephens)			
May 1982	SE 099 472	100	Ilkley	2.viii.82	Woods	Torrent
May 1982	SE 164 494	180	Asquith	Aug 1982	Grass verge	Ditch
June 1982	SE 083 499	100	Addingham	2.viii.82	Pasture	R. Wharfe
8.v.85	SE 123 485	100	Ilkley	Sept 1985	Woods	Ditch
29.iv.86	SE 099 474	160	Ilkley	15.viii.86	Woods	Torrent
29.iv.86	SE 098 468	260	Ilkley	2.ix.86	Woods	Torrent
31.v.85	SD 934 785	250	Hubberholme	26.viii.85	Wooded valley	Torrent
			Potamophylax latipennis (Curtis)			
May 1982	SE 164 494	180	Asquith	16.viii.82	Grass verge	Ditch
12.xi.82	SE 080 552	100	Bolton Abbey	Aug 1983	Roadside	Ditch
30.viii.84	SE 068 617	200	Appletreewick	29.viii.84	Limestone val	Troller's Gill Beck
14.ix.80	SE 202 503	110	Otley	22.ix.80	Pasture	R. Washburn
7.viii.85	SE 195 524	130	Otley	21.viii.85	Wet pasture	R. Washburn
15.viii.85	SE 099 472	155	Ilkley	Sept 1985	Steep wooded valley	Torrent
1.v.86	SD 858 836	600	Fleet Moss	4.vii.86	Peat moor	Ditch
8.ix.86*	SD 903 792	260	Yockenthwaite	9.ix.86	Limestone past	R. Wharfe
			Potamophylax rotundipennis (Brauer)			
19.vii.82	SE 046 602	130	Appletreewick		Pasture	R. Wharfe
			Halesus digitatus (Schrank)			
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
18.iii.82	SE 099 469	200	Ilkley		Woods	Torrent
3.vi.82	SE 139 492	100	Denton		Pasture	Ditch
22.vi.84	SD 935 785	250	Hubberholme		Wooded valley	Torrent
16.ii.85	SE 052 575	130	Barden	Sept 1985	Steep bank	R. Wharfe
9.vi.86	SE 033 612	140	Burnsall	22.ix.86	Pasture	R. Wharfe
8.v.87	SE 21 48	90	Otley		Grassland	Lindley Res.

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Halesus radiatus (Curtis)			
3.vi.82	SE 139 492	100	Denton		Pasture	Ditch
24.iv.82	SE 099 469	230	Ilkley		Woods	Torrent
6.vii.83	SE 083 495	100	Addingham		Pasture	R. Wharfe
22.vi.85	SE 102 475	150	Ilkley		Woods	Torrent
16.ii.85	SE 052 575	130	Barden	Sept 1985	Wooded bank	R. Wharfe
29.iv.87	SE 244 454	45	Pool		Pasture	R. Wharfe
			Melampophylax mucoreus (Hagen)			
1982	SD 975 678	200	Kilnsey	1.xi.82	Grass verge on limestone	Stream
23.iv.85	SE 135 469	200	Ben Rhydding	Sept 1985	Golf course	Pond
			Micropterna lateralis (Stephens)			
3.vi.82	SE 139 492	100	Denton		Pasture	Ditch
4.xi.83	SE 052 574	130	Barden	18.vi.84	Steep bank	R. Wharfe
15.iii.84	SE 099 469	110	Ilkley	19.vi.84	Moor (*Juncus*)	Trickle
2.v.85	SE 189 518	120	Otley	27.v.85	Steep banks	R. Washburn
			Micropterna sequax McLachlan			
8.v.85	SE 122 485	100	Ilkley	28.vi.85	Woods	Ditch
8.xii.85	SD 90 79	260	Yockenthwaite	28.vi.86	Limestone past	Trickles
2.iv.86	SD 869 815	320	Oughtershaw	11.vi.86	Pasture	R. Wharfe
1.v.86	SD 858 836	600	Fleet Moss	20.vi.86	Peat moor	Ditch
			Allogamus auricollis (Pictet)			
3.vi.82	SE 141 486	100	Denton		Pasture	Ditch
22.ii.85	SE 083 495	100	Addingham	Sept 1985	Pasture	R. Wharfe
23.iv.85	SE 135 469	200	Ben Rhydding	Sept 1985	Golf course	Pond
19.v.86	SD 938 774	250	Buckden		Pasture	R. Wharfe
8.ix.86*	SD 903 792	260	Yockenthwaite	15.ix.86	Limestone past	R. Wharfe
30.vi.87	SD 93 72	225	Arncliffe		Limestone past	R. Skirfare
			Chaetopteryx villosa (F.)			
28.v.82	SE 119 470	230	Ilkley	10.xi.82	Heather moor	Trickle
6.vii.84	SE 054 652	270	Hebden	4.x.84	Grass moor	Stony stream Gill Beck
23.viii.84	SE 158 538	220	Timble	9.x.84	Woods	Stony stream
30.vii.84	SE 068 617	200	Appletreewick		Limestone val	Weedy stream
16.ii.85	SE 052 575	130	Barden	Sept 1985	Steep bank	R. Wharfe
23.ii.86	SD 975 678	200	Kilnsey	16.ix.86	Grass verge	Stream
16.vii.86	SD 934 784	250	Hubberholme	28.ix.86	Wooded valley	Torrent
30.v.86	SE 099 472	160	Ilkley	31.ix.86	Wooded valley	Torrent
18.vi.86	SD 858 836	600	Fleet Moss	30.x.86	Grass moor	Ditch nr spring
14.iii.86	SE 122 485	100	Ilkley	30.x.86	Middleton Woods	Ditch
			Goera pilosa (F.)			
1980	SE 083 495	100	Addingham		Pasture	R. Wharfe
3.vi.82	SE 139 492	100	Denton		Pasture	Ditch
9.iv.83	SE 077 566	120	Bolton Abbey		Wooded valley	Torrent
			Silo nigricornis (Pictet)			
24.iv.79	SE 077 566	200	Bolton Abbey		Wooded valley	Torrent
			Silo pallipes (F.)			
24.iv.79	SE 077 566	200	Bolton Abbey	2.vii.79	Wooded valley	Torrent
29.iv.86	SE 099 472	155	Ilkley		Wooded valley	Torrent

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Lepidostoma hirtum (F.)			
7.viii.77	SE 099 472	155	Ilkley	9.viii.77	Wooded valley	Torrent
1980	SD 968 723	225	Kettlewell		Pasture	R. Wharfe
1980	SD 900 794	260	Yockenthwaite		Pasture	R. Wharfe
12.v.82	SE 114 482	90	Ilkley		Park	R. Wharfe
2.ii.83	SE 080 552	130	Bolton Abbey	21.vii.83	Wooded hillside	Trickle
26.iii.83	SD 934 785	250	Hubberholme	2.vii.83	Wooded valley	Torrent
8.vii.83	SE 075 542	120	Bolton Abbey	31.vii.83	Pasture	R. Wharfe
13.vi.85	SE 083 495	100	Addingham	10.vii.85	Pasture	R. Wharfe
19.v.86	SD 934 784	250	Hubberholme	9.viii.86	Wooded valley	Torrent
13.vi.86	SE 032 612	140	Burnsall	1.viii.86	Pasture	R. Wharfe
			Crunoecia irrorata (Curtis)			
12.ii.86	SE 080 552	130	Bolton Abbey	20.vii.86	Wooded hillside	Trickle over tufa
17.ii.86	SE 077 555	140	Bolton Abbey		Steep hillside	Trickle
14.iii.86	SE 122 485	100	Ilkley	8.ix.86	Woods	Ditch
12.vi.86	SE 027 619	150	Hebden	20.vii.86	Pasture/woods	R. Wharfe
			Athripsodes albifrons (L. 1758)			
4.vii.82	SE 083 495	100	Addingham	16.viii.82	Pasture	R. Wharfe
1982	SE 112 482	90	Ilkley		Park	R. Wharfe
2.ii.83	SE 077 553	120	Bolton Abbey	6.vii.83	Pasture	R. Wharfe
29.vii.83	SE 033 612	140	Burnsall	22.viii.83	Pasture	R. Wharfe
16.ii.85	SE 027 619	160	Hebden	28.vii.85	Woods	R. Wharfe
			Athripsodes aterrimus (Stephens 1836)			
29.vi.87	SE 144 479	100	Ilkley	9.vii.87	Old gravel pit	Lily pond
			Athripsodes bilineatus (L. 1758)			
1980	SE 116 482	90	Ilkley		Park	R. Wharfe
17.ii.85	SE 027 619	160	Hebden	18.vi.85	Woods	R. Wharfe
			Athripsodes cinereus (Curtis 1834)			
16.ii.85	SE 052 574	130	Barden	29.vii.85	Steep bank	R. Wharfe
13.vi.85	SE 083 495	100	Addingham	20.vii.85	Pasture	R. Wharfe
			Ceraclea dissimilis (Stephens 1836)			
13.vii.83*	SE 033 612	140	Burnsall	19.vii.83	Pasture	R. Wharfe
29.vii.83*	SE 033 612	140	Burnsall	8.viii.83	Pasture	R. Wharfe
			Mystacides azurea (L. 1758)			
1980	SD 968 723	225	Kilnsey		Pasture	R. Wharfe
			Mystacides longicornis (L. 1761)			
2.vii.86	SE 119 468	230	Ilkley	23.vii.86	Heather moor *Calluna*	Tarn in *Callitriche*
			Sericostoma personatum (Spence)			
1980	SD 975 678	200	Kilnsey		Grass verge	Stream
2.v.85	SE 195 522	140	Otley	23.vi.85	Wooded banks	R. Washburn
30.xi.85	SE 026 624	150	Hebden		Pasture	R. Wharfe
29.iv.87	SE 244 454	45	Pool		Pasture	R. Wharfe
			Beraea maurus (Nielson 1948)			
22.vi.87	SE 080 552	130	Bolton Abbey		Wooded hillside	Trickle from spring
22.vi.87	SE 077 555	150	Bolton Abbey		Wooded hillside	Trickle from spring

TABLE 3 (continued)

Date collected	Nat Grid Reference	Alt m.	Locality	Emerged	Terrestrial environment	Aquatic environment
			Beraea pullata (Curtis 1834)			
1980	SE 116 482	90	Ilkley		Park	R. Wharfe
8.v.85	SE 122 487	100	Ilkley		Woods	Moss over ditch
15.ix.86	SE 080 552	110	Bolton Abbey		Steep hillside	Moss, trickle
12.vi.86	SE 027 619	150	Hebden		Pasture/woods	R. Wharfe
			Odontocerum albicorne (Scopoli)			
4.viii.82*	SD 986 662	210	Grassington	6.viii.82	Pasture	Trickle
18.iv.83	SE 085 555	130	Bolton Abbey		Pasture	Stream
10.x.84	SE 18 50	150	Otley		Wet pasture	Ditch, rushes
10.iii.85	SE 190 511	180	Otley	15.viii.85	Woods	Stream
2.iv.86	SD 869 815	320	Oughtershaw	26.vi.86	Pasture	R. Wharfe
8.ix.86	SD 903 792	260	Yockenthwaite		Limestone past	R. Wharfe
			Molanna angustata Curtis			
2.vi.86	SE 119 468	230	Ilkley	16.vii.86	Heather moor	Tarn

More recent work by Dr. D. Cotton and students at the School of Environmental Science in the University of Bradford has shown that the water of the streams joining Spicey Gill above the marine band is acid, in the range 3.3 to 5.0. The pH of seepage into the stream close to the marine band was shown to be 6.3, whereas that of the water seeping from the peat on the upper moor was 3.3 to 3.7, and of the grit seepage, 3.7 and 4.1. These figures support the hypothesis that the marine band causes the increase in pH of the water of Spicey Gill as it flows down from the moor.

Two marine bands occur in Heber's Ghyll (Stephens 1942) which is a landslip area, the stream bed of which is a jumble of blocks of gritstone. Limestone erratics occur on Ilkley Moor (Wray 1954) and it is possible that some lie hidden in the stream bed. Calcareous material in either form might affect the pH of the water. Little can be stated at present as to the effect of calcareous material in the glacial drift. Nothing is known about the neutralizing effect of spring water, nor about the influence of the vegetation on the pH of the water of the streams on Ilkley Moor. The relative importance of the various factors awaits evaluation.

It is clear, however, that the pH of the water affects its Trichopteran fauna. As crushed limestone added to an acid stream causes an increase in pH, it could be expected to bring about an increase in the number and variety of Trichopteran larvae in the water. Several specific records are worthy of comment. The occurrence of *Diplectrona felix*, *Crunoecia irrorata* and *Beraea pullata* in the Wharfe at and above Burnsall is of interest. *D. felix* is described as being found in small rapid streams in shady woods (Hickin 1967). *C. irrorata* is said to inhabit very small, fast flowing forest streams (Hickin 1967). *B. pullata* is described as semi-terrestrial (Wiberg 1979). Their presence in the Wharfe around Burnsall may be accounted for by the considerable fluctuation in the speed and volume of its water. It could also be that *C. irrorata* and *B. pullata* were washed down by a stream which joins the river close to where these larvae were found.

Agapetus delicatulus, described as being local in distribution, (Hickin 1967) was found in the Wharfe and some tributaries from Hubberholme to Ilkley. *Rhyacophila septentrionis*, described as very local in distribution (Hickin 1967) was found in the Wharfe from Yockenthwaite to Pool. Two rare species, *Potamophylax rotundipennis* and *Hydropsyche fulvipes* are recorded here but not confirmed. The larvae of the former species have certainly been found in the Leeds area (Hiley 1967).

The adults of three species were collected in the study area. *Brachycentrus subnubilus* was seen in swarms by the Wharfe at Ben Rhydding and Pool. *Agapetus ochripes* was

captured at Pool, and *Stenophylax vibex* was captured at a light trap at Burley in Wharfedale and donated.

In this study, 68 species of caddis larvae have been collected. A further 13 species are listed by Brown and Whitehead for this area. These are *Chimarra marginata*, *Cyrnus trimaculata*, *Tinodes dives*, *T. waeneri*, *Ecnomus tenellus*, *Agrypnia obsoleta*, *Trichostegia minor*, *Ecclisopteryx guttulata*, *Lasiocephala basalis*, *Athripsodes commutatus*, *Ceraclea annulicornis*, *C. nigronervosa*, *Mystacides nigra*.

A survey of the Malham Tarn area of Yorkshire (Holmes 1963) records 71 species. Of these, 34 species are also found in mid and upper Wharfedale. Cooling (1982) records the caddis larvae of 14 streams in southern England, listing 53 taxa, of which 34 are also recorded in this study. Twenty-two taxa are common to all three areas.

Table 3 lists the records of caddis larvae found in all habitats investigated in mid and upper Wharfedale. Caddis larvae are indicators of clean fresh water. Apart from the moors, where the water is acid, larvae have been collected in good numbers in all the places visited, and thus indicate the clean quality of the waters of the area.

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TABLE 4
Collections in SE 15 and SE 25

Species	Date Coll	Nat Grid Ref	Alt	Emerged	Terr Env	Acq Env
Plectrocnemia conspersa	2.v.85	SE 18 51	140		Pasture	R. Washburn
Polycentropus flavomaculatus	2.v.85	SE 18 51	140		Pasture	R Washburn
Drusus annulatus	Sept 1980	SE 196 508	30	Nov. 1980	Pasture	R Washburn
Drusus annulatus	June 1981	SE 18 51	170		Wooded banks	R. Washburn
Drusus annulatus	7.vni.85	SE 195 524	100	10.x.85	Wooded banks	R Washburn
Limnephilus centralis	2 v.85	SE 1 5	120	20.v.85	Grassland	Streams
Limnephilus griseus	2.v.85	SE 194 532	140	15.v 85	Grassland	Reservoir
Limnephilus lunatus	2.v.85	SE 194 529	140	14 vii.85	Grassland	Reservoir
Limnephilus vittatus	2.v.85	SE 194 532	140	30.v.85	Grassland	Reservoir
Potamophylax latipennis	14.ix.80	SE 202 503	110	22.ix.80	Pasture	R. Washburn
Potamophylax latipennis	7.viii.85	SE 195 524	130	21.viii.85	Wet pasture	R. Washburn
Micropterna lateralis	2.v.85	SE 189 518	120	27.v.85	Steep banks	R Washburn
Chaetopteryx villosa	23.viii.84	SE 158 538	220	9.x.84	Woods	Stony stream
Sericostoma personatum	2.v.85	SE 195 522	140	23.vi.85	Wooded banks	R. Washburn
Odontocerum albicorne	10.x.84	SE 18 50	150		Wet pasture	Ditch, rushes
Odontocerum albicorne	10.iii.85	SE 190 511	180	15 viii.85	Woods	Stream

TABLE 4
Collections in SE 15 and SE 25

Species	Date Coll	Nat Grid Ref	Alt	Emerged	Terr Env	Acq Env
Plectrocnemia conspersa	2.v.85	SE 18 51	140		Pasture	R. Washburn
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Limnephilus centralis	2.v.85	SE 1 5	120	20.v.85	Grassland	Streams
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Limnephilus lunatus	2.v.85	SE 194 529	140	14.vii.85	Grassland	Reservoir
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Potamophylax latipennis	14.ix.80	SE 202 503	110	22.ix.80	Pasture	R. Washburn
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Chaetopteryx villosa	23.viii.84	SE 158 538	220	9.x.84	Woods	Stony stream
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Odontocerum albicorne	10.x.84	SE 18 50	150		Wet pasture	Ditch, rushes
Odontocerum albicorne	10.iii.85	SE 190 511	180	15.viii.85	Woods	Stream

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Appendix

The form in which the information has been assembled lends itself to computer processing by treating Table 3 as a database. The information can then be rearranged in a variety of ways. Table 4 gives an example in which all collections made in National Grid squares SE15 and SE25 have been selected; similar selections could be made for any squares.

Technical Note: In order to make the data in Table 3 suitable for use in a database, it was necessary to insert the species name on each line (since many databases will not take note of headings) and add a column for Species number so that subsequent additions could be placed in their proper sequence. The database was then told to select those entries which contained either 'SE 1– – 5– –' or 'SE 2– – 5– –' in the 'Nat Grid Ref' column and to print out the seven columns which appear in Table 4. The criteria used and the total number selected are printed at the end. (Note that in the particular program used '–' is a 'wild card' and can be any character.)

Virtually any computer and database program could be used. Those actually used were a Compaq (IBM compatible) and PCFile.

RHB

A VERY EARLY YORKSHIRE DUCK DECOY

EVA CRACKLES

The following item from the account book (1678–97) of Elizabeth Hotham of Scorborough has recently come to hand:

> July 14, 1682: 'I reserved an account of Dallton rent for the year 1681 with an account of the fleet fowle, coy fowle, the rents of Rotsea and the dumbles'

'Dumbles' was a dialect name for *Scirpus lacustris* (Lake Club-rush) which appears to have been confined to Holderness (Crackles 1974). I had not met the terms 'fleet fowle' and 'coy fowle' previously. It seems that 'coy fowle' were taken by decoy and that 'fleet fowle' were those birds shot whilst flying elsewhere on the estate. Coy was

an early name for a decoy. Martin Limbert has suggested a second possible explanation of the terms 'fleet fowle' and 'coy fowle', the former being free-winged birds taken in a decoy and the latter tame 'lure' ducks (often with wings clipped) which were an important part of decoy operations. However, he adds that in that case he cannot see why the two types of bird should require separate accounts. Whichever explanation is correct, the use of a decoy is involved.

It is well known that there was a decoy at Scorborough. The site, which was in Arram Carrs, can still be found east of the railway between Arram and Lockington stations. The item from Elizabeth Hotham's account book does not state where the dumbles grew, but in a later account book of Sir Charles Hotham Arram Carr is specified. There seems no doubt that the 'coy fowle' mentioned here were trapped in the Scorborough decoy.

Nelson (1907) and Bramley (1973) state that there is no record of the age of the decoys at Scorborough, Meaux and Watton, nor of the exact date when they were discontinued. All went out of use between 1762 and 1800 as a result of drainage. Sir Charles Hotham was compensated by the Beverley and Barmston Drainage Act (1798), which rendered the Scorborough decoy unusable.

The decoy and method of decoying were introduced by the Dutch. Limbert (1978) gives the date of completion of the first Yorkshire Decoy on Potteric Carr, near Doncaster as 1661.

The data for 1682 in the Scorborough account book suggests that the Scorborough Decoy was one of the earliest in Yorkshire.

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BOOK REVIEWS

A Catalogue of Natural Science Collections in North-east England, edited by **Peter Davis** and **Christopher Brewer**. Pp iv + 333. North of England Museums Service. 1986. £9.50 paperback, including postage and packing, from: North of England Museums Service, 27 Sutton Street, Durham DH1 4BW.

Register of Natural Science Collections in Yorkshire and Humberside, edited by **M. M. Hartley**, **A. Norris**, **C. W. Pettitt**, **T. H. Riley** and **M. A. Stier**. Pp. xvi + 343. Area Museum and Art Gallery Service for Yorkshire and Humberside. 1987. £18.00 paperback, plus postage and packing from: Mrs J. Platt, Yorkshire and Humberside Museums Council, Farnley Hall, Hall Lane, Leeds LS12 5HA.

The publication of these two catalogues make the local collections of our region more widely known, and will considerably aid researchers throughout Britain and indeed elsewhere. Sectionalized information provides catalogues to the contents of both public and private collections via subject and collector, and important biographical information is supplied, particularly in the case of the volume covering north-east England.

It is a pity that such invaluable reference volumes should not have been bound more durably and with titled spines, the lack of the latter ensuring their anonymity on library shelves!

RICHARD HENRY MEADE: ARACHNOLOGIST, ENTOMOLOGIST AND SURGEON

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Richard Meade appears to have been the first English specialist to make a study of British Harvestmen and was one of the early collectors and workers on spiders, quite apart from the important contributions he made in entomology, in particular on the Diptera. Although he may be best remembered as an English dipterologist, it was his work on Arachnids which marks him out as an important pioneer in this country. He wrote the first monograph on British opilionids and published several notes on spiders between 1852 and 1861.

Meade was born in 1814, the son of the Reverend Richard Meade of Princes Risborough, Buckinghamshire (Note 1), a member of a well-established local family, involved in the management of a school and the founding of a parochial library (Note 2).

In mid-Victorian Britain there were few professional scientists in the sense that they earned their livings in their chosen profession, but amateurs from the clerical and medical professions made a significant contribution to natural history. They often had libraries, microscopes, scientific equipment and sufficient leisure time to pursue their hobbies. They exchanged material, exhibited specimens at meetings and went on collecting trips in different parts of the country, with people of similar tastes, to find and record new species.

In the 'chatty' style of the Victorian naturalist, Meade's (1857) sketch of a 'Short arachnological excursion' gives an example of such an expedition. He describes the journey from Bradford by mail train to a quiet rural district between Buckingham and Bicester, 'A few days as a guest at a friend's house, with regular meal breaks between excursions resulted in observations of spiders, bees and a capture of a ten-spined stickleback'. Knowledgeable about the country as a whole, these naturalists were authorities on the flora and fauna in the localities in which they lived. Meade's stronghold was the rapidly growing and industrialized area of the West Riding around Bradford.

Meade began his medical career as an apprentice at Bedford Infirmary, and was then a student at St Bartholomew's Hospital, London. One fellow student and life-long friend was the notable surgeon James Paget (Power 1973a). Paget's (1885) account of his student years included a comment that eighteen months was 'quite sufficient for them to obtain a very fair knowledge of medicine'. He described Meade and other friends as 'working gentlemen, helpful through life' (1901).

Meade, reminiscing in old age, commented on his success in examinations, but says that he was 'never first when Paget was there' (Note 3). Meade especially remembered three teachers, Henry Earle (Moore 1908) William Lawrence (Moore, 1909) and Peter Mere Latham (Watson 1875). Latham's lectures on clinical medicine are still remembered (Jarcho 1964).

One can only speculate on the influence of Latham, who wrote that the student should cultivate an '*impartial* and *honest* mind' and avoid the 'common infirmities . . . a premature desire to generalise, an eagerness to arrive at conclusions and a readiness to rest in them' (Martin 1878).

Another lecturer of note at St Bartholomew's was Frederic Farre (Note 4) A Fellow of the Linnean Society and perhaps a significant influence on Meade's scientific education.

Meade completed his studies by 1836 with the examinations of the Apothecaries' Society and the Royal College of Surgeons. His various hospital appointments in London included lecturer in Botany at the new Middlesex Hospital Medical College, anatomy demonstrator at St George's Medical School and surgeon at the Western General Dispensary (Note 5).

Meade became an FRCS in 1845, was associated with the Bradford Infirmary for nearly fifty years, a medical officer for local industries and a magistrate. He was a founder member and first president of the Bradford Medico-Chirurgical Society (note 6) and contributed frequently to its work (Goyder 1898). His possible first publication was a paper for the Royal Medical and Chirurgical Society, with which he was associated for over half a century (Meade 1840). By the late 1870s he had published seventeen medical papers, mainly brief clinical reports, in the *British Medical Journal*, *Lancet* and *Medical Times*.

When Meade arrived in the West Riding in 1840, where he took over the practice of William Sharp, surgeon and later FRS and specialist in homeopathic medicine (Power 1973b), Bradford was a rapidly growing and successful manufacturing town based on the worsted trade, the population having doubled between 1831 and 1851. Bradford itself was regarded as a filthy and unhealthy place in which to live and 'by the 1840s the environmental despoilation consequent upon this accelerated and unrestricted development was readily apparent' (Thompson 1982). Morrell (1985) has described the dearth of scientific activity in the town. There were several abortive attempts to establish a Philosophical Society, including the third in 1839 in which William Sharp was involved and the fourth in 1864 which was more successful for a time.

Two important events occurred in 1839, the year before Meade arrived. The foundation stone of the New Mechanics' Institute building was laid in April and William Sharp had given a course of lectures in the winter of 1838/9 'with the express intention of cultivating a taste for science' (Bell 1888) in the town. We do not know the reasons for Meade's decision to move to Bradford but he may have been aware of these developments which were encouraging signs of change.

Meade was involved in the fourth revival of the Bradford Philosophical Society, initially a 'three guinea' member, and an honorary curator of the library (Note 7). He recommended Louis Miall for the post of secretary, which was an important move both for science in Yorkshire and in the career of a notable biologist (Baker & Bayliss 1983, 1985).

By the 1870s, Bradford with other Yorkshire towns, had several scientific societies and there were opportunities for local professional men to contribute to scientific and general educational activities. Meade, however, apart from his long-standing work in the Medico-Chirurgical Society, seems to have worked alone and 'independently of the societies' (Maltby & Winter 1925).

Meade began his scientific writings with a paper entitled 'Observations on the study of dipterous insects' (1850) and began by noting the 'sad neglect' of the study of Diptera.

> The chief point of interest in the study of Diptera, however, is the greater degree of novelty which it possesses: the field is fresher and less trodden down (at least in England), and thus the labourer will be rewarded by reaping a more abundant harvest.

Meade published work on spiders between 1852 and 1861, including a paper (1859) read at the British Association meeting in Leeds in 1858. During the early 1850s, he was busy collecting, recording and identifying species, corresponding and amassing information on the group. He wrote to H. T. Stainton (Note 8).

> I shall be really much obliged to you if you will preserve any spider that you may meet . . . for though many that you will find may be common you will probably get some rare and perhaps undescribed species, each locality presenting some peculiarities.

Relatives, friends and even his patients were solicited to collect spiders on their tours in this country and abroad. Specimens were exchanged and duplicates given to friends and colleagues. It is clear from his correspondence that Meade examined spiders from many countries. Subscriptions were made to share costs for special collectors to obtain material or to purchase spiders. Meade wrote to Pickard-Cambridge (Note 9) that 'I should be very glad to subscribe a share of £5 towards a collection of spiders from the Andes' but that he had been 'disappointed two or three times by foreign collectors'.

Prior to Blackwall's publication by the Royal Society (1861–1864), very little was known about spiders and the papers that existed were scattered through various periodicals. Meade wrote to Stainton (Note 10) that 'There is no work on the subject to take as a starting point . . . the student on this subject will find no descriptions of even the most common species in his own language.'

Amongst the people requesting help at this time was O. Pickard-Cambridge and Meade wrote to him in 1855 (Note 11) about a collection he had sent for identification: 'I have at last named them all and will send you the list in a few days time, there are several new or undescribed species among them.'

It seems clear from the correspondence between Meade and Pickard-Cambridge that Meade was initially regarded as the taxonomic expert. Increasingly, however, he found his professional career took up so much of his time that he was unable to devote any to arachnology. By 1860 Blackwall's sight had become impaired, he was reaching seventy and too old to make any further major contribution. Pickard-Cambridge (Note 12) thus gradually became the acknowledged British expert. Meade again wrote (Note 13)

> I wished to have undertaken with you some popular work on British spiders but I now resign it entirely into your hands. I shall be happy to give you any private assistance that I can but I think you now know so much more about spiders than I do . . . before long the study of British spiders will devolve entirely upon you.

In an early paper Meade (1852) described a method of overcoming existing problems by using glass tubes and keeping spiders individually in separate tubes with alcohol. This marked an important advance

> The method recommended is, to inclose the specimens in small glass bottle tubes, made of thin glass tubing, each about an inch and a half long, with a flat bottom, which prevents them from breaking easily when standing on end, and with a small lip all round the upper edge, which enables them to be closely corked.

George Johnston of Berwick (Boulger 1973) was also associated with this new technique (Allen 1978) and Savory (1961) has pointed out the related work of Dufour and Walckenaer. Meade also described to Pickard-Cambridge how he preserved spiders (Note 14).

> In drying spiders the great thing to preserve their form is to dry them very slowly and to favour this, brush them once with glycerine: this evaporates so slowly that it prevents the spider from shrivelling up. I have dried some very well this way.

One of the most important of Meade's early papers was a 'Monograph on the British Species of Phalangiidae or Harvestmen' (1855). This has been commended by Savory (1961) as 'it marks the beginning of systematic opilionology in this country' and, together with its supplement (1861) 'Meade covered two-thirds of all the British Harvestmen'. A letter from Charles Darwin, mistakenly sent to Louis Miall in Bradford, enquired about this paper (Baker & Bayliss 1983). Meade claimed in 1860 that 'I am proud to think that I have been the means of inducing one or two entomologists to take up Arachnology in earnest, and have thus indirectly tended to advance our knowledge of English spiders'.

He presented a collection of spiders to the Entomological Society which was subsequently purchased by Professor Westwood for the Oxford Museum at a sale in July 1863 of the Society's British collection. 102 specimens of spiders together with some of his Diptera are in the Hope Collections in the University Museum and the archives contain the list of species bought (Smith 1986). Meade discovered this when he visited J. O.

Westwood (1805–1893) at Oxford in 1865 and enquired about the spider collection in the museum (Note 15).

In 1859 Meade was the only Bradford entomologist listed in Stainton's *Entomologist's Annual*, out of around one hundred in Yorkshire and nearly a thousand in Britain who were 'willing to help young beginners' (Stainton 1859).

Meade wrote four papers in collaboration with Peter Inchbald, described by an obituary writer in 1896 as a 'genuine field naturalist', (Note 16). These papers, out of nearly ninety scientific publications, were the only ones involving a collaborator. Meade's total output was impressive for a part-time naturalist. His last work, on the Cordyluridae, (Meade, 1899) was published in his mid-eighties and shortly before he died on 23rd December 1899. After his death, Meade's collection of Diptera was presented to the Yorkshire College at Leeds.

Obituary writers were complimentary about Meade's position in Bradford Society. *The Lancet* (Note 3) called him a 'good sound surgeon and practitioner of the old school' in a 'noteworthy, if unobtrusive career'. In the *British Medical Journal* (Note 17) he was remembered as a man with a 'fine presence, always kind and courteous'.

Assessment of his scientific work included McLachlan's account (Note 1)

> The difficult and obscure *Muscidae* (in the broad sense) became his speciality, and he was regarded as an authority thereon. We have heard Mr. Meade's work in *Diptera* condemned as not being sufficiently in advance of the time. From its style we think he never intended it to be more than tentative. He cleared the ground for future workers.

In the *Transactions of the Entomological Society of London* (Note 18) the President noted:

> The few students in British Dipterology can ill afford to lose so good a worker as he was. Even during the last few years he has done a great deal to bring two of the best known families of British Diptera, the Tachinidae and Anthomyidae into shape and order.

One of the interesting and characteristic aspects of the naturalist's life is the complicated web of fellow workers and correspondents. An Austrian writer (Note 19) who described Meade's enthusiasm as an entomologist declared that he would 'always honour his memory' and pointed out that he had corresponded with Meade for many years.

A more recent assessment (Locket & Millidge 1951), noting especially his harvestmen papers, described him as a 'keen collector' and 'skilful naturalist'.

Meade won international recognition for his research on the British Diptera and became one of the experts of his time. His considerable output in entomology consisted mainly of systematic works on the Anthomyidae, Scatophagidae (= Cordyluridae), Tachinidae and Sarcophagidae. His first paper on the Diptera was published in 1850, his last almost fifty years later was on the same group. By the end of the century he was described as one of the 'greatest authorities in Britain' (Wheeler 1900).

Meade's papers on arachnids included the first list of British Harvestmen, and a list of 231 species of British spiders (Meade 1853) marked the publication of the first scientifically accurate lists. He was also the first worker to associate a named species with an actual site (Smith 1982). Blackwall (1861–1864) made numerous references to Meade and it is clear he contributed many spiders and much information for Blackwall's classical work and for O. Pickard-Cambridge's subsequent work on spiders. Meade's major contribution to arachnology, however, is generally regarded as the important influence he had in 'stimulating Pickard-Cambridge's interest in spiders and for introducing him to Blackwall' (Locket & Millidge 1951).

Meade was clearly an industrious long-term worker who published well into old age. He studied largely on his own but was a substantial correspondent. He emerges as a prominent figure in entomology and a major English pioneer in arachnology.

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A YEAR-LONG SURVEY OF THE BEES (HYMENOPTERA: APOIDEA) ALONG THE DEAN RIVER AT WOODFORD, CHESHIRE

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Introduction

As no exhaustive survey of the bees in Lancashire and Cheshire has been published since Gardner (1901), and even recent local, more specialized surveys appear to be rare, an intensive, year-long survey of the bee fauna at one site in east Cheshire was made to provide future ecological and faunistic studies with a more recent base from which to make comparisons.

The study site, located about 2km west of Woodford along the Dean River (Nat. Grid SJ 875825), consisted of two large fields and (downstream) a small wood, bordering each side of the Dean. Where the Dean abutted the two fields, high (2–3m) steep dirt banks, providing abundant nesting sites for many aculeate Hymenoptera, overlooked the river. Although the fields were periodically grazed by sheep and cattle, a variety of flowering plants (esp. *Caltha*, *Carduus*, *Cirsium*, *Ranunculus*, *Silene*, *Taraxacum*, and several species of Umbelliferae) and other nectar and pollen sources (esp. *Crataegus monogyna*, *Prunus spinosa*, *Rubus* hedges and sallow trees) abounded along the stream and several rural gardens with a variety of fruit trees and flowering herbs and shrubs were within flight range of the Dean. The immediate area had been primarily agricultural for several hundred years, although small textile mills had been in operation at one time both upstream (ca. 5km) and downstream (less than 1 km) from the study site (Garratt 1983).

Materials and Methods

Most collections were made at flowers or nesting sites along the river and on flowering trees or shrubs, using aerial insect nets. A few species were recovered only by sweeping shrubby vegetation on warm days. Collections were made at the site on 34 days during late 1985 (from the 1st of September on) and most of 1986 (up until the end of August). In all, 419 solitary bees were collected, as well as a large number of social and parasitic bumble bees. Precise figures are not given for the bumble bees since (a) more intensive investigations were being conducted on these, and (b) many records were made by sight identification without actually collecting and preserving specimens. We also avoided taking larger samples of common and easily identified solitary species (e.g. *Andrena fulva* females) than were necessary for establishing species identities and a rough measure of relative abundance.

The attempt was made to find and collect all bee species present, rather than to sample in an unbiased fashion. As a result, our estimates of relative abundance are only rough but our representation of the total fauna present is probably fairly complete.

Generic and species identifications were made initially by the authors, with reference to Alford (1975), Guichard (1974), the IBRA and BRC *Bumble Bee Atlas* (1980), Perkins (1919, 1922), Prŷs-Jones and Corbet (1987), and Willmer (1985). Determinations were later checked and added to by George R. Else of the British Museum (Natural History).

Results and Discussion

419 specimens of solitary bees, belonging to 26 species, were collected in addition to 9 species of social and parasitic bumble bees. These are listed in Figure 1, accompanied by an indication of their apparent relative abundance. These represented 10% of the

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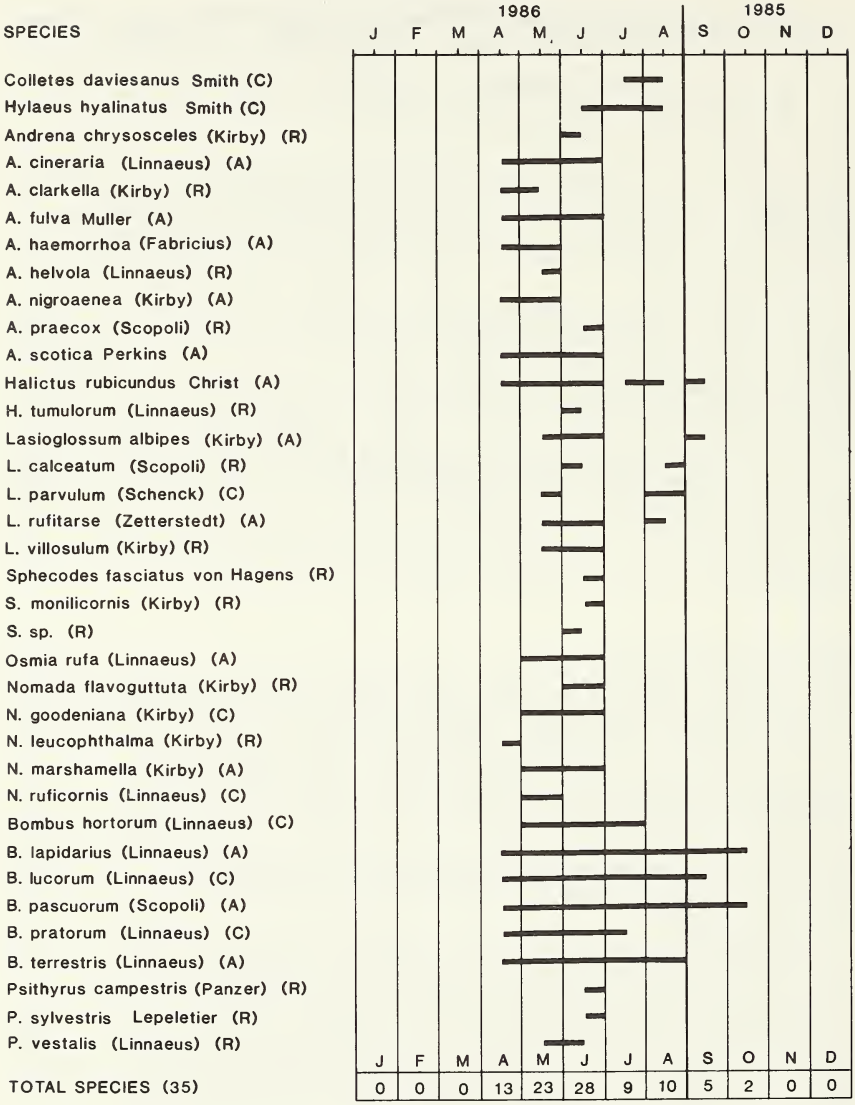
SPECIES
1986
1985
J F M A M J J A S O N D
Colletes daviesanus Smith (C)
Hylaeus hyalinatus Smith (C)
Andrena chrysosceles (Kirby) (R)
A. cineraria (Linnaeus) (A)
A. clarkella (Kirby) (R)
A. fulva Muller (A)
A. haemorrhoa (Fabricius) (A)
A. helvola (Linnaeus) (R)
A. nigroaenea (Kirby) (A)
A. praecox (Scopoli) (R)
A. scotica Perkins (A)
Halictus rubicundus Christ (A)
H. tumulorum (Linnaeus) (R)
Lasioglossum albipes (Kirby) (A)
L. calceatum (Scopoli) (R)
L. parvulum (Schenck) (C)
L. rufitarse (Zetterstedt) (A)
L. villosulum (Kirby) (R)
Sphecodes fasciatus von Hagens (R)
S. monilicornis (Kirby) (R)
S. sp. (R)
Osmia rufa (Linnaeus) (A)
Nomada flavoguttuta (Kirby) (R)
N. goodeniana (Kirby) (C)
N. leucophthalma (Kirby) (R)
N. marshamella (Kirby) (A)
N. ruficornis (Linnaeus) (C)
Bombus hortorum (Linnaeus) (C)
B. lapidarius (Linnaeus) (A)
B. lucorum (Linnaeus) (C)
B. pascuorum (Scopoli) (A)
B. pratorum (Linnaeus) (C)
B. terrestris (Linnaeus) (A)
Psithyrus campestris (Panzer) (R)
P. sylvestris Lepeletier (R)
P. vestalis (Linnaeus) (R)
J F M A M J J A S O N D
TOTAL SPECIES (35)
0 0 0 13 23 28 9 10 5 2 0 0

FIGURE 1

Seasonality of the bees at Woodford. Collection data were assigned to either early or late halves of each month.

A = Abundant, collected on 4 or more visits and represented by multiple specimens on each of at least 3 visits;

C = Common, recovered on at least 3 visits and represented by at least 5 specimens total;

R = relatively Rare, recovered on only one or two visits and represented by less than 5 specimens.

recorded British species of Colletidae, 13.4% of the Andrenidae, 15.8% of the Halictidae, 3% of the Megachilidae, 12.2% of the Anthophoridae and 37.5% of the Apidae (data from Kloet & Hincks, 1978). Along the river itself, the several species of *Andrena* and *Lasioglossum* and *Halictus rubicundus* were the most conspicuous elements of the fauna. Well away from the river, on flowers upon higher ground, *Hylaeus hyalinatus*, *Osmia ruta* and *Colletes daviesanus* rivalled the others in abundance by early summer.

Figure 1 summarises the observed seasonality of the bees at Woodford during the two seasons. Although the complete 'season' in the chart is actually a composite of the 1986 spring and summer with the 1985 autumn, the resulting picture is probably close to the result one could have observed in either year independently. Both years were phenologically late ones, with few warm, sunny days. The *Andrena* spp. appear to be early-season bees, the colletids as late-season; the *Lasioglossum* spp. appear to be mostly bivoltine. By August, nesting activity along the stream-banks was confined to halictids, whereas during late spring-early summer andrenids were the dominant nesting species. *Bombus* spp. were, on the whole, active for the longest periods, as well as being the only bees active on the many cold, windy days.

Several additional species were recovered within 30 km of the site, and may well have been present in low numbers at the site: *Megachile willughbiella* (Kirby), recovered on the University of Manchester campus, and *Andrena barbilabris* (Kirby) and *Sphecodes gibbus* (Linnaeus), both collected at Over Peover, Cheshire.

Conclusion

Our survey probably produced a fairly typical species list for an east Cheshire agricultural locality with streamside nesting opportunities. A complete survey of Cheshire bees would have to include the faunas of the upland regions of the western Peak District, as well as more coastal/estuarine areas of the North.

Felton (1974) has discussed the desirability of and requirements of faunistic studies of aculeate Hymenoptera in Britain. The effects of newer agricultural practices, especially hedge removal, have proved detrimental to bees, especially bumble bees (Williams 1982). Some of the changes in the fauna and flora over the last few decades have been documented, particularly for the south of England (e.g. Felton 1974, Perring 1974). Despite the recent introduction of vice-county recording schemes and periodic updating of distribution records, more study is needed at representative local sites (such as our own on the perimeter of the rapidly-expanding Greater Manchester urban area, or those of Archer (e.g. 1985 in Yorkshire) to detect smaller-scale changes in the fauna in response to accelerating environmental disturbances (Bonham-Carter 1971): Bees are particularly useful as indicator organisms for studying environmental change (Felton 1974), besides playing an important role as pollinators of natural and cultivated plants.

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BOOK REVIEW

Yorkshire by Rail, edited by **Philip Ralph and Mike Crowhurst**. Pp 80. Published for the Railway Development Society by Jarrold & Sons, 1987. £2.75.

It is many years since the YNU organised its field meetings to start from convenient railway stations and the railway companies allowed YNU members to pay concessionary rates. An interest in natural history can still add greatly to the pleasure of a train journey and, apart from spotting interesting-looking habitats, it is possible to identify many birds, mammals and flowers, even from an Intercity 125.

This booklet has been written by members of the Railway Development Society to illustrate the advantages of seeing Yorkshire by rail and, therefore, to encourage greater use of rail travel. It takes the form of a series of descriptions of the train journeys which can still be made in Yorkshire, with information on the views and objects which can be seen from the carriage windows (with a natural emphasis on the railway interest) and in the towns and cities served by rail. All stations are mentioned, whether operating, closed or proposed, and for me it brought back memories of Sunday School outings from the now-demolished Osmondthorpe Station in Leeds during the era of steam. Although my travels around Yorkshire are now mainly done by car (often to attend YNU meetings) I often pass over, under or alongside railway lines and many of the descriptions were equally applicable to a road journey.

This booklet is well up-to-date and includes a mention of Rotherham Central Station which opened in April 1987. It is remarkably free from typographical errors (I only noticed 3 or 4) and is a most enjoyable account of Yorkshire as seen from a civilised mode of transport.

WEA

ENTOMOLOGICAL REPORTS FOR 1984–1986

COLEOPTERA

J. H. FLINT

The publication in 1984 of the first part of a Coleoptera report to appear after a lapse of eleven years has precipitated an avalanche of records upon the recorders. Many of these records are of common species but there was a very considerable number of uncommon species among them and they included some extremely uncommon beetles. Only uncommon species have been entered in the records and these generally only when they were from areas where they were not previously known or from where they had not been reported for many years. Limitations of space restrict the list of species below to the more remarkable of the entered records and there remains a mass of records filed in bulk that can be searched by entomologists following particular lines of enquiry.

One beetle, *Cetonia cuprea*, is worth especial mention; this handsome near-relative of the resplendent metallic-green rose chafer, *C. aurata* L., is a splendid addition to our county fauna. A northern beetle, in its larval stage it is reported to inhabit the lower parts of the nests of wood ants and the wood ants *Formica lugubris* Zett. abound in many parts of the North-East Yorkshire moorlands. Attention to the immediate environs of the wood ants' nests on hot, sunny days in May and June, even if digging into the lower parts of the nests is abjured, could be worthwhile.

There now appear to be more entomologists actively working on the beetles in the county than ever before and my thanks go to all who have submitted records or who have named or confirmed the identity of species. The initials used in the list below are those of R. G. Booth, R. Crossley, M. L. Denton, W. A. Ely, Mrs. H. E. Flint, J. H. Flint, A. P. Foster, P. J. Hodge, C. Johnson, P. Kendall, R. S. Key, R. J. Marsh, Mrs. J. Payne, K. G. Payne, D. T. Richardson, P. Skidmore, E. J. Smith.

† New county records. * New vice-county records.

Leistus rufomarginatus Duft. (*61) Allerthorpe Common, 1982; R.G.B. (62) Mirk Side Wood, Goathland (SE80) 29/6/86; J.H.F.

Nebria livida F. (61) Cayton Bay in some numbers, 1985; R.S.K. Also P.K.

Broscus cephalotes L. (63) Elland Gravel Pit, 27/7/83; M.L.D. Normally a coastal beetle.

Trechus subnotatus Dej. (63) Huddersfield district, Spring Wood, 25/3/84 and Almondbury, 7/3/86; M.L.D. Clearly well-established in this area.

Bembidion humerale Stm. (63) Hatfield Moors, 4/5/84; P.K. and P.S. P.S. reports the discovery of sub-fossil remains on the Somerset levels which indicates that it may be a native and not a recent arrival at Thorne and Hatfield.

Pterostichus anthracinus Ill. (61) Aughton Ings, 26/5/86; M.L.D. Formerly known from Bubwith and a few other marshy areas but not reported since 1919.

Agonum versutum Gyll. (*61) Allerthorpe Common, one 30/6/84; M.L.D. Only previously from Ryhill Reservoir.

Licinus depressus Payk. (61) Cottam Well Dale (SE9763), 14/9/83; R.G.B.

Chlaenius vestitus Payk. (63) Barnby Dun, 6/85; P.S. The only established population known in Yorkshire was in the Bridlington, Sewerby, Flamborough district.

Metabletus truncatellus L. (*64) Burton Leonard Quarry Nature Reserve, on limestone scrubland, 5/3/85; J.H.F.

Hydroporus longicornis Sharp (*63) Denaby Ings Nature Reserve, 26/4/86; P.K.

H. obsoletus Aubé (65) Crooks Beck, Semerwater, 3/9/85; R.S.K. (det. A.P.F.).

Graptodytes granularis L. (63) Anston Stones Wood, 13/4/85; W.A.E.

†*Potamonectes griseostriatus* Deg. (65) Birkdale Tarn (NY8501) at 1,600′; 5/10/84; J.H.F. Following a report that A. P. Foster had found this beetle here, the first reported

occurrence in England of this mountain beetle, J.H.F. visited the Tarn and found two examples.

Scarodytes halensis F. (*63) Lindrick Common, 25/4/85; W.A.E.

Helophorus tuberculatus Gyll. (*64) Askham Bog, 5/4/85; P.J.H.

Abraeus globosus Hoff. (62) Duncombe Park, Helmsley, 10/9/85; R.J.M. There have been no records during the past 70 years.

†*Aeletes atomarius* Aubé (62) Duncombe Park, 10/9/85; R.J.M.

Carcinops pumilio Goeze (*61) Fraisthorpe, Bridlington, 31/8/86; P.K.

Ochthebius bicolon Germ. (*63) Sprotbrough, in an indoor light fitting, 21/8/84; R.J.M.

Limnebius papposus Muls. (63) Mog Dale (SE11), 9/9/85; M.L.D.

Ptenidium laevigatum Gyll. (*63) Melton Wood (SE5103) 18/7/86; R.J.M. (det. C.J.).

P. punctatum Gyll. (*63) Blackmoorfoot (SE01), 2/7/85; M.L.D. (det. C.J.). Three earlier records are all coastal under seaweed.

†*Oligella intermedia* Bes. (63) Melton Wood, in grass heap, 2/7/86; R.J.M. (det. C.J. who states 'second British record').

†*Ptilidium fuscum* Er. (62) Thirsk, 13/10/86; R.J.M. (det. C.J.). (63) Melton Wood, 2/7/86 and Shirley Pool, 19/7/86; R.J.M. (det. C.J.).

P. spencei All. (*63) Melton Wood, 18/7/86; R.J.M. (det. C.J.).

†*Acrotrichis fraterna* Johnson (63) Melton Wood, 2/7/86; R.J.M. (det. C.J.).

Agathidium nigrinum Stm. (*63) Drop Clough (SE0413), 26/10/86; M.L.D.

Silpha tristis Ill. (*63) Thorne Moor (SE7116), many in tussocks, 7/3/84; R.J.M. Only very rarely reported in Yorkshire and not since 1923.

†*Micropeplus tesserula* Curtis (64) Bishop Wood, 20/4/84; P.J.H. and R.C.

†*Anotylus saulcyi* Pand. (62) Appleton le Moors, 25/5/85; W.A.E.

Oxytelus fulvipes Er. (*63) Rossington Bridge (SE6300), in litter under *Carex paniculata*, 5/85; R.J.M. A rare beetle of old, established marshes.

Stenus latifrons Er. (*63) Tunnel End Reservoir, Marsden (SE0312), 12/4/86; M.L.D. There are three very old records in Yorkshire but none in this century.

Gauropterus fulgidus F. (63) Elland Park Wood (SE12), 9/8/86; M.L.D. Although records are widely scattered it is only rarely reported and not since 1954.

†*Neobisneus procerulus* Grav. (63) Treeton, 23/8/84; W.A.E.

†*Philonthus micantoides* Ben. (63) Hook Moat, Goole (SE7525), 5/11/83; P.K.

P. nigrita Nor. (*63) Orange Wood, Blackmoorfoot (SE101123), 21/7/86; M.L.D. There are four earlier records, all in V.C. 62, none in the past 50 years.

P. porcus Sharp (63) Kiveton Park (SK48), 6/76; B. Smallwood per W.A.E. (det. P. M. Hammond.

P. subuliformis Gr. (*63) Blackmoorfoot, in tree sparrow nest, 7/11/86; M.L.D. The only previous example was from Knaresborough Ringing Station in 1973.

Gabrius subnigritulus Reitt. (*63) Netherton, 27/4/84; M.L.D.

Cafius xantholoma Grav. (*63) Blackmoorfoot (SE0912), 1/10/86; M.L.D. A most unusual situation for a beetle which is common under dry seaweed on the coast. All other Yorkshire records for the genus are coastal.

Quedius aridulus Jans. (*63) Royd Edge Clough (SE00), 29/9/85; M.L.D. Second Yorkshire locality.

Q. fumatus Steph. (*63) Broadhead Clough, 28/3/84; M.L.D.

Q. longicornis Kraatz (63) Blackmoorfoot, 17/5/85; M.L.D. A rare beetle of moles' nests.

Q. nemoralis Baudi (*63) Red Quarry Plantation (SK58), 1978; W.A.E.

Q. puncticollis Thoms. (*65) Colsterdale, 7/7/84; M.L.D.

Q. riparius Kelln. (*62) Caydale, 24/6/84; R.J.M.

Q. schatzmayri Grid. (*63) Deer Mill (SE01), 13/10/85; M.L.D. Rotherham (SK4692) 20/9/86; W.A.E.

Q. semiaeneus Stm. (*65) Colsterdale, 2/9/84; W.A.E.

Mycetoporus angularis Muls. (*63) Dean Wood (SE1213), 27/5/85; M.L.D. A single on the sandhills at Saltburn in 1896 is the only other record.

Lamprinodes saginatus Grav. (61) Burdale Bank (SE8662), 2/4/84; R.G.B.
Bythinus macropalpus Aubé (63) Salt Springs Wood (SK2496), 21/11/83; E.J.S.
Aegialia sabuleti Panz. (*61) Spurn, 20/9/86; M.L.D. More usually associated with riverside sandbanks.
†*Aphodius equestris* Panz. (64) Carthick Wood (SE3446), 13/5/84; R.C.
†*A. foetens* F. (63) Crowden Great Brook (SE10), 30/5/85; M.L.D. No previous Yorkshire record. This may well be mistaken in the field for the very common and superficially very similar *A. fimetarius* L.
†*A. putridus* Fourc. (63) Broadhead Clough, 28/3/84; M.L.D.
†*Cetonia cuprea* F.(62) Ellers Wood, near Hawnby (SE5392), 1984; R.G.B.
Calyptomerus dubius Marsh. (*61) Bubwith Bridge (SE7036), 18/4/66; P.K. (*63) Beaumont Park, Huddersfield, 27/10/84; M.L.D.
Clambus armadillo Deg. (*63) Sprotbrough, 14/5/84; R.J.M.
C. punctulus Beck (*63) Hall Heys Wood, Huddersfield (SE11), 6/7/84; M.L.D. Melton Wood, 18/7/86; R.J.M.
†*Elodes pseudominutus* Klausn (62) Ashberry Nature Reserve; P.S. (63) Ravenfield Park (SK4895), 27/6/84; W.A.E.
Hydrocyphon deflexicollis Mull. (65) Marsett (SD8986), 19/7/86; H.E.F. (det. J.H.F.).
Byrrhus arietinus Steff. (*62) Lockton High Moor (SE8595), 1983; R.G.B. The only other is Skipton 1934.
Malthodes fibulatus Kies. (62) Caydale, 24/6/84; R.J.M. Only twice before in Yorkshire.
Lampyris noctiluca L. (64) Raikes Wood, Buckden (SD97), 1985; D.T.R.
†*Dictyoptera aurora* Hbst. (63) Sandall Beat, 16/3/86; P.K.
Dermestes maculatus Deg. (63) Huddersfield (shabab), 2/2/86; M.L.D.
Anthrenus museorum L. (*63) Sprotbrough, one in garden, 10/7/84; R.J.M.
†*Stethomezium squamosum* Hinton (63) Huddersfield (shabab), 8/2/86; M.L.D.
†*Ptinus lichenum* Marsh. (63) Netherton (SE11), 20/11/83; M.L.D.
P. sexpunctatus Panz. (63) Huddersfield (shabab); 8/2/86; M.L.D.
Aplocnemus nigricornis F. (62) Scar Wood, Goathland, 28/6/86; M.L.D.
†*Carpophilus mutilatus* Er. (63) Sprotbrough, many in compost heap, 19/10/84; R.J.M.
†*Meligethes ochropus* Stm. (63) Swinton (SK4497), 16/5/78; M. Crittenden and D. W. Twigg (det. W.A.E.).
M. solidus Kug. (*63) Lindrick, 11/5/85; W.A.E.
†*Epuraea adumbrata* Mann. (62) Duncombe Park, 10/9/85; R.J.M.
†*Monotoma brevicollis* Aubé (63) East Dene (SK5790), 5/8/81; W. L. Barrington (det. W.A.E.).
Cryptophagus ruficornis Steph. (63) Thorne Moor, in *Daldinia* on birch, 7/3/84; R.J.M.
Triplax russica L. (*61) Skipwith Common, 1984; R.G.B. Only otherwise in Yorkshire at Hatfield and Thorne.
Orthoperus brunnipes Gyll. (61) Sunk Island, in litter, 17/8/86; R.J.M.
Caenoscelis subdeplanata Bris. (*61) Sunk Island, under tidal refuse, 17/8/86; R.J.M. (63) Sprotbrough, indoors, 19/6/83; R.J.M. The first British examples were from Bretton in 1965.
†*Atomaria rhenana* Kraatz (61) Sunk Island, in vegetable refuse on salt-marsh, 17/8/86; R.J.M.
Hyperaspis pseudopustulatus Muls. (63) Broadhead Clough, 16/6/84; M.L.D.
Stephostethus angusticollis Gyll. (63) Honley Wood (SE11), 21/7/85; M.L.D. The only previous record, at least 80 years ago, was from Wath on Dearne.
†*Cis lineatocribratus* Mell. (63) Elland Park Wood (SE12), 7/6/86; M.L.D.
Mycetophagus atomarius F. (*61) Garrowby Hill (SE75), 23/4/83; J.H.F.
Eledona agricola Hbst. (*64) Acaster Malbis, from the fungus *Meripilus giganteus*, 5/11/86; K.G.P. Only previously in Yorkshire from Roche Abbey.
Cylindronotus laevioctostriatus Goeze (63) Bretton (SE21), 4/4/85; M.L.D. The only Yorkshire record in the last 70 years.
Orchesia undulata Kraatz (65) Colsterdale, 7/7/84; M.L.D.

Abdera flexuosa Payk. (*63) Storthes Hall, Huddersfield, 18/5/84; M.L.D.
†*Anaspis costai* Emery (61) Howden (SE7531), 13/7/85; P.K.
A. lurida Steph. (*63) Sinking Wood (SE10), 19/7/85; M.L.D.
Asemum striatum L. (64) Bishop Wood, 6/86; P.K.
Molorchus minor L. (64) Bishop Wood, 24/6/85; R.C.
Anaglyptus mysticus L. (61) Foggathorpe, in old willow, 12/5/85; P.K. (63) Denaby Ings, 26/4/86; P.K. Rarely reported in South Yorkshire which appears to be its normal northerly limit.
Chrysolina orichalcia Müll. (64) Otley, from trees on banks of R. Wharfe, 23/6/85; R.C.
C. violacea L. (63) Pot Ridings Wood, Sprotbrough (SE5301), in *Glechoma hederacea*, 23/5/84; R.J.M. Apart from a very doubtful record ('very plentiful above Settle . . . 1932') which probably results from a confusion of names with what is now *Timarcha goettingensis* L. which is very plentiful above Settle, this rare but conspicuous beetle has not been reported in Yorkshire since 1910.
Phyllobrotica quadrimaculata L. (62) Lake Gormire (SE58), on *Scutellaria*, 15/7/84; J.H.F.
Luperus flavipes L. (63) Sandall Beat, 8/6/84; R.J.M. Gowdall, near Snaith (SE6122), 12/6/85; P.K.
Longitarsus kutscheri Rye (*63) Brockadale, 10/5/80; W.A.E.
Mantura matthewsi Curtis (*61) Potter Brompton (SE97), on *Helianthemum*, 21/6/86; H.E.F. (det. J.H.F.).
Chaetocnema arida Foud. (*61) Skipwith Common, 1983; R.G.B.
†*Apion atomarium* Kby. (61) Burdale Bank (SE8662), 1984; R.G.B.
†*A. punctigerum* Payk. (62) Hayburn Wyke, in rape field, 19/5/84; M.L.D.
Otiorrhynchus nodosus Müll. (63) Blakey Reservoir (SE00), 15/6/84; M.L.D.
O. porcatus Hbst. (64) Colton, Tadcaster, 21/9/74; K.G.P. Malham Tarn, 22/7/84; M.L.D.
Omias mollinus Boh. (63) Moorgate (SK4291), 25/6/85; W.A.E. (64) Micklefield (SE43), 9/6/82; J.H.F.
†*Barypithes pyrenaeus* Seid. (63) Elland Park Wood, 22/9/85; W.A.E.
†*Magdalis duplicata* Germ. (64) Goldsborough, 9/9/83; M.L.D.
Rhyncholus lignarius Marsh. (63) Wentworth Park, Rotherham, 15/4/84; R.C. and R.J.M.
†*Bagous lutulosus* Gyll. (61) Allerthorpe Common. 30/6/84; M.L.D. (det. C.J.).
Dorytomus longimanus Forst. (63) Lindholme (SK7106), on old poplars, 4/5/84; R.J.M. Hatfield Moor, 4/5/84; P.K. (64) Pool in Wharfedale, 24/6/83; R.C.
Orthochaetes setiger Beck (62) Stonyflat Wood (SE98), 20/6/86; M.L.D.
Ceuthorrhynchus campestris Gyll. (*63) Bretton, 7/7/86; M.L.D. Only reported in Yorkshire from Knaresborough early in the nineteenth century.
†*C. pictitarsis* Gyll. (63) Brockadale, 10/5/80; W.A.E.
Amalus scortillum Hbst. (*63) Thryberg Reservoir (SK49), 6/7/85; M.L.D.
†*Anthonomus bituberculatus* Thoms. (62) Caydale, 24/6/84; R.C.
A. conspersus Desb. (*63) Lindrick Hill, 11/5/85; W.A.E.
Curculio venosus Grav. (*63) Treeton, Rotherham, on oak, 1/7/79; J.P. Sandall Beat, on oak, 8/6/84; R.J.M.
†*Tychius meliloti* Steph. (61) Filey Sands (TA1281), 27/7/85; W.A.E. (63) Elland gravel pit, 2/8/86; M.L.D.
†*Miarus plantarum* Germ. (63) Lafton Great Wood (SE11), 17/8/84; M.L.D.
Ramphus oxyacanthae Marsh. (*62) Bloody Beck (SE9498), 1984; R.G.B.
Dryocoetinus alni Georg (63) Broadhead Clough, 16/6/84; M.L.D.
Xyleborus dispar Hell. (*64) Bishop Wood (SE5534), 21/4/84; J.H.F.
†*Pityophthorus lichtensteini* Ratz. (61) Breighton Launch (SE7034), 17/8/85; P.K.
Pityogenes chalcographus L. (*63) Langsett, 17/6/86; M.L.D.

GROUND NESTING BY LONG-EARED OWLS *(ASIO OTUS)* ON RESTOCKED SITES IN UPLAND FORESTS

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In upland Britain, the Long-eared Owl (*Asio otus*) is almost exclusively a tree nesting species (Glue 1977; Mikkola 1983; Cramp 1985). It usually breeds in the old nests of other species, particularly the Carrion or Hooded Crow (*Corvus corone*), but it also uses a wide range of other species' nests including Magpie (*Pica pica*), Sparrowhawk (*Accipiter nisus*) and Woodpigeon (*Columba palumbus*). Ground nesting has been recorded occasionally, but this has usually been restricted to Heather (*Calluna vulgaris*) moorland, or to other sites where tree nests are lacking (Glue 1977). The type of upland habitat in which Long-eared Owls breed varies from small shelter belts, which are often surrounded by large areas of agricultural land, to newly afforested areas (Glue 1977, Village 1981), and native pinewoods in NE Scotland (Nethersole-Thompson and Watson 1974). Their status in large areas of maturing spruce forest is unclear.

In Kielder Forest, Northumberland, Long-eared Owls only breed along the forest/moorland edge or occasionally in small shelter belts surrounded by large areas of young forest. They appear to be completely absent from the centre of the maturing forest, where second generation crops are being established in a matrix of felled and replanted (restocked) areas (Petty, unpublished data). In 1987, a pair of Long-eared Owls reared a brood of 4 chicks from a clutch of 5 eggs, in a ground nest on a restocked site. The previous crop of Norway Spruce (*Picea abies*) and Sitka Spruce (*Picea sitchensis*) had been felled in 1986, leaving alternate rows of dead branches up to 1 m high and bare ground. The nest scrape was situated on the ground, but under one of these rows of dead branches. The 8 ha site, restocked in 1987, was on a slope above an extensive tract of rough grassland to the north. To the east and west were closed-canopy spruce crops, and to the south was a restocked area which had been planted in 1975. The Long-eared Owls were observed hunting over this latter area, where the Field Vole (*Microtis agrestis*) populations were high, and where sympatric Tawny Owls (*Strix aluco*) had their most productive year since the last good vole year in 1984 (Petty 1987a, Petty in press). Ten prey items recorded in the nest were all Field Voles. Prior to the trees being felled in 1986, the site had been occupied for at least the last 7 years by a pair of Tawny Owls which bred in a nestbox. After felling, the Tawny Owls moved to a new box 870m to the SW, while another pair bred in a box 910m to the east. Therefore, the pair of Long-eared Owls had positioned themselves about midway between these nearest two pairs of Tawny Owls, in a part of the forest where Tawny Owl density was at its lowest (Petty 1987b), and in a year when food was abundant (Petty 1987a, Petty in press). Incubation commenced on about 4 April at the Long-eared Owls nest, compared to 5 and 8 March for the two Tawny Owls. Long-eared Owls are also known to have reared young successfully in 1984, from an almost identical ground nest under dead branches, on a 3 ha site which had been felled for less than one year at Fearnoch Forest, Argyll (D. Dugan pers. comm.).

In the Border Forests, Short-eared Owls (*Asio flammeus*) regularly nest on restocked sites, but they usually select sites which have been felled for at least 2–3 years, where a grassy vegetation has developed in which their nests are usually placed (Petty unpublished data). We have never found a Short-eared Owl's nest under dead branches, and only once on a site so recently felled.

It will be important to see if Long-eared Owls can colonise the interior of extensive spruce forests as large, second generation fellings become more widespread and so provide potentially rich foraging areas. Field Voles appear to be the most abundant small mammal on restocked sites (Petty 1987a), and are an important food for breeding

Long-eared Owls (Glue and Hammond 1974, Yalden 1985). If Long-eared Owls continue to be absent, or confined to where Tawny Owls are least abundant in upland forests, this may provide evidence that they cannot successfully compete with the widely distributed and more powerful Tawny Owl.

Acknowledgements

We thank Philip Maitland for first drawing our attention to the nest in Kielder Forest, Dr M. Marquiss for his comments on an earlier draft of this note, and Linda Petty for the typing.

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BOTANICAL REPORT FOR 1986

Flowering Plants and Ferns

The Recorders thank those members who have contributed to this report by sending in records.

The names of contributors are given in full the first time they appear in each vice-county report and thereafter initials are used. 10 km grid references are indicated by figures.

† new county record. * new vice-county record.

EAST YORKSHIRE (V.C. 61) (F. E. Crackles)

Records are included only for species occurring in ten 10 km squares or fewer. Aliens are included only if they are believed to be established.

Coronopus didymus (L.) Sm. Field track, Knapton 44/87; E. Chicken.

Erysimum cheiranthoides L. Wintringham 44/87; E.C.

Stellaria neglecta Weihe Bank of R. Derwent near Firby 44/76, 1985; E.C. det. P. Benoit.

Atriplex laciniata L. River side, Spurn 54/41; E.C. Barmston 54/16; Wild Flower Soc. Excursion.
Radiola linoides Roth On a different part of Allerthorpe Common from where it was known twenty-five years ago, 1985, C. Hartley.
Aphanes microcarpa (Boiss. & Reut.) Rothm. Potter Brompton 44/97; Y.N.U. Excursion.
Sedum reflexum L. Disused railway station, Ottringham 54/22; F. E. Crackles.
Drosera intermedia Hayne Allerthorpe Common, 1985, C.H., conf. a 1931 record. The only post-1930 V.C. 61 record.
Epilobium adenocaulon Hausskn. × *E. parviflorum* Schreb. Garden, Driffield 54/05; E.C. conf. W. A. Sledge.
Epilobium palustre L. × *E. parviflorum* Schreb. = *E.* × *rivulare* Wahlenb. By lagoon, Withernsea 54/32; F.E.C.
Anthriscus caucalis Bieb. Potter Brompton 44/97; Y.N.U. Excursion.
Sison amomum L. Near Humber bank, Sunk Island 54/21; Y.N.U. Excursion.
Rumex tenuifolius (Wallr.) Löve Wintringham 44/87; E.C.
Rumex maritimus L. Boynton 54/16, 1985, E.C.
Blackstonia perfoliata (L.) Huds. Chalk quarry, Sherburn 44/97; N. Deall.
Echium vulgare L. Duggleby Dale 44/86, 1985, N.D.
Veronica polita Fr. Sunk Island 54/21; Y.N.U. Excursion.
Lathraea squamaria L. Millington Wood 44/85, 1985; N.D.
Galeobdolon luteum Huds. Plantation, High Mowthorpe 44/86, 1985; N.D.
Senecio aquaticus Hill × *S. jacobaea* L. = *S.* × *ostenfeldii* Druce Canal bank, Wansford 54/05, 1985; E.C.
Scirpus setaceus L. Boynton 54/16; D. Bramley.
**Festuca trachyphylla* (Hackel) Krajina Chalk bank, near Wintringham 44/97; E.C. conf. P. J. O. Trist.
Apera interrupta (L.) Beauv. Near Potter Brompton 44/97; E.C. Scampston 44/87; E.C.

NORTH-EAST YORKSHIRE (V.C. 62) (T. F. Medd)
Gymnocarpium dryopteris (L.) Newm. Danby Head 45/60; Mrs N. Sykes.
Pilularia globulifera L. Strensall Common 44/65; British Pteridological Society per C. Jermy. Confirmation of old record; see *Nat.* 1959 p. 24.
Ophioglossum vulgatum L. Robin Hood's Bay 45/90; R. and M. Gulliver.
Ranunculus lingua L. Hilton 45/41; I. C. Lawrence.
Hypericum elodes L. Near Osmotherley 44/49; N.S.
Tilia cordata Mill. Glaisdale 45/70; N.S.
Genista tinctoria L. Liverton 45/71; I.C.L. Skinningrove 45/72 and Robin Hood's Bay 45/90; R. and M.G.
Rosa pimpinellifolia L. Pockley 44/69; N.S.
Saxifraga granulata L. Broxa 44/99; N.S.
Ribes alpinum L. Chop Gate 44/59; N.S.
Salix pentandra L. Chop Gate 44/59; N.S. Waupley Moor 45/71; I.C.L.
Blackstonia perfoliata (L.) Huds. Skinningrove (two locations) 45/72; R. and M.G.
Pinguicula vulgaris L. Troutsdale 44/98; B. Pashby.
Stachys arvensis (L.) L. New Brotton 45/62; I.C.L.
Anthemis cotula L. Easington 45/71; I.C.L.
Picris echioides L. Skinningrove 45/72; R. and M.G.
Gagea lutea (L.) Ker-Gawl. Castle Levington 45/40; I.C.L.
Iris foetidissima L. Saltburn 45/62; I.C.L. (confirmation of pre-1930 record).
Epipactis palustris (L.) Crantz Harwood Dale 44/99; F. Horsman.
Orchis morio L. Langdale 44/99; Mrs M. Robinson.
Dactylorhiza incarnata ssp. *incarnata* (L.) Soó Troutsdale 44/98; F.H.

D. maculata × *Gymnadenia conopsea* = × *Dactylogymnadenia legrandiana* (Camus) Soó Fylingdales 45/90; F.H.
Blysmus rufus (Huds.) Link Coatham Marsh 45/52; I.C.L.
Elymus pycnanthus (Godron) Melderis Skinningrove 45/72; R. and M.G.
E. farctus (Viv.) Runemark ex Melderis with the above 45/72; R. and M.G.
Hordelymus europaeus (L.) Harz Caulkleys Bank 44/67; Miss J. Lambert.
†*Holcus lanatus* × *mollis* = *H.* × *hybridus* K. Wein Wykeham Forest (nursery) 44/98; E. Chicken.

SOUTH-WEST YORKSHIRE (V.C. 63) (D. R. Grant)
Equisetum sylvaticum L. Catlow Hill, Carleton 34/94; T. Schofield; Newsholme Dean 44/04; D. R. Grant.
Dryopteris borreri Newm. Sutton in Craven 44/04; D.R.G.
Ophioglossum vulgatum L. near Cullingworth 44/03; T.S.
Ranunculus omiophyllus Ten. Earnshaw Hole Moor 34/92; D.R.G.
Clematis vitalba L. Dewsbury, introduced with Magnesian Limestone boulders on river bank improvement 44/22; E. Thompson.
Thalictrum flavum L. Rossington Bridge 43/69; Y.N.U. Excn.
Chelidonium majus L. Cleckheaton 44/12; E.T.
Corydalis claviculata (L.) DC. Bullcliffe Wood, Midgley 44/21; D.R.G. Rossington Bridge 43/69; D. Bramley.
Lepidium campestre (L.) R.Br. Thwaites, Keighley 44/04; T.S.
Teesdalia nudicaulis (L.) R.Br. Rossington Bridge 43/69; Y.N.U. Excn.
Hypericum maculatum Crantz Old railway, Cadeby Common 43/59; M. Yewdall.
Myosoton aquaticum (L.) Moench Rossington Bridge 43/69; D.B.
Ulex gallii Planch. near Cullingworth 44/03; T.S.
Prunus padus L. Oxenhope 44/03; T.S.
Sorbus aria (L.) Crantz Park Wood, Keighley 44/04; T.S.
Saxifraga granulata L. Carr Head, Glusburn 34/94; D.R.G.
Oenanthe aquatica (L.) Poir. near Highfields, Doncaster 43/50; D.R.G.
Daucus carota L. near Ferrybridge 44/42; D.R.G.; Shaft Holme 44/50; E.T.
Humulus lupulus L. Thorpe Audlin 44/41; E.T.
Populus tremula L. Wooley Edge, Wakefield 44/31; D.R.G.
Lysimachia vulgaris L. Worth, Keighley 44/04; D.R.G.
L. thyrsiflora L. Loxley Valley, confirmation of old record and discovery of two new colonies in adjacent km grid squares 44/38; Y.N.U. Excn.
Ligustrum vulgare L. Fryston Wood, Castleford 44/42; T.S.
Myosotis ramosissima Rochel Finningley Park 43/69; D.R.G.
Scrophularia aquatica L. Bullcarr Mires, Thorpe Audlin 44/41; E.T.
Veronica catenata Pennell Southfield Reservoir 44/61; T.S.
Pedicularis sylvatica L. near Cullingworth 44/03; T.S.
Melampyrum pratense L. near Holmfirth 44/10; J. Lucas.
Orobanche minor Sm. Fryston Wood, Castleford 44/42; A. Pearson.
Galium verum L. Felkirk 44/31; D.R.G.
Inula conyza DC. Sludge pits near Thorpe Marsh 44/60; E.T.
Eupatorium canabinum L. near Highfields, Doncaster 44/50; D.B.
Crepis paludosa (L.) Moench Sutton Clough 44/04; T.S.
Carduus nutans L. Heath, Wakefield 44/31; E.T.
Potamogeton crispus L. Harry Man Dam, Cleckheaton 44/12; T.S.
P. coloratus Hornem. Askern Clay Pit, confirmation of old record 44/51; D.R.G.
Juncus compressus Jacq. near Highfields, Doncaster 44/50; D.B.
J. subnodulosus Schrank Askern Clay Pit, confirmation of old record 44/51; T.S.
Allium oleraceum L. near Highfields, Doncaster 44/50; E.T.
Carex laevigata Sm. near Cragg Vale, Halifax 44/02; D.R.G.

C. demissa Hornem. Digley Reservoir, Holmfirth 44/10; Mirfield Naturalists' Society Excn.
C. disticha Huds. Bullcarr Mires, Thorpe Audlin 44/41; D.R.G. Near Highfields, Doncaster 44/50; E.T.
C. curta Gooden. Standedge, Huddersfield 44/00; J.L.
Puccinellia distans (L.) Parl. near Highfields, Doncaster 44/50; D.R.G.
Aira praecox L. Emley 44/21; T.S.
Vulpia bromoides (L.) Gray Shaft Holme 44/50; E.T.
Calamagrostis canescens (Weber) Roth Rossington Bridge 43/69; D.R.G.

MID-WEST YORKSHIRE (V.C. 64) (L. Magee)

Records were received from nine recorders. These covered a large number of species. Intensive studies of the *Orchidaceae* are being made by several recorders and a number of old records have been confirmed together with one new vice-county record. Botanists in the Castleford area are continuing to survey the south-eastern parts of VC 64 where changing land use is affecting the flora.

Only a small number of records submitted can be included in the report and the recorder thanks all who have done so much field work and sent in records. All records of interest in addition to new Atlas records are sought for.

Asplenium adiantum-nigrum L. Nidd Village 44/36 1979; D. J. Tennant.
Polypodium interjectum Shivas Knaresborough 44/35 1984; Ingleton 34/77; D.J.T.
Dryopteris borreri Newm. Long Preston 34/85; D. R. Grant.
Clematis vitalba L. Newthorpe Quarry 44/43; Mrs P. Abbott.
**Ranunculus fluitans* L. River Wharfe, Collingham 44/24; L. Magee.
Actaea spicata L. Chester Wood, Threshfield 34/96; Miss H. Lefevre; roadside near Fairburn 44/42; H. Pearson. Confirmation of an old record.
Astragalus glycyphyllos L. Newthorpe Quarry 44/43; P.A.
Rosa canina × *gallica* = *R.* × *alba* L. Kilnsey 34/96; Mrs F. Houseman.
Heracleum mantegazzianum Somm. & Levier Airton 34/86; H.L.
Silaum silaus (L.) Schinz & Thell. Kettlewell Meadows 34/97; L.M.
Rubus caesius × *idaeus* Fairburn Quarry 44/42; A.P.
Salix pentandra L. Brackenthwaite 44/35; D.R.G.
Salix cinerea × *purpurea* × *viminalis* = *S.* × *forbeyana* 44/24; F.H.
Rumex longifolius × *obtusifolius* = *R.* × *arnotti* Druce Duck Street, Greenhow 44/61; F.H.
Hottonia palustris L. Hutton Wandersley 44/55; Bishop Monkton 44/36; D.J.T.
Mentha rotundifolia (L.) Hudson Garnetts' Mill, Otley 44/24; F.H.
Colchicum autumnale L. Castlehill Wood, Micklefield 44/43; A.P.
Pseudorchis albida (L.) A. C. D. Love Buckden 34/97; L.M.
Dactylorhiza traunsterneri (Sauter) Soó Grassington 34/96; Kilnsey 34/96; D.J.T.
D. fuchsii × *traunsterneri* Grassington 34/96; D.J.T.
D. incarnata ssp. *pulchella* Soó Lawkland Moss 34/76; F. Horsman.
D. purpurella (T. & T. A. Stephenson) Soó Farnham Mires 44/36; Miss M. Sanderson.
Typha angustifolia L. Barlow, nr. Selby 44/63; D.R.G.

NORTH-WEST YORKSHIRE (V.C. 65) (T. F. Medd)

It was very encouraging to receive more records than usual from this vice-county and it is only a pity that more of these did not qualify for inclusion in this report.

Hornungia petrea (L.) Reichb. Quarry above Marsett 34/88; Miss R. Payne (confirmation of pre-1930 record).
Puccinellia distans (L.) Parl. A66, near Bowes 35/91; N. Scott.

CASUALS AND ADVENTIVES (E. Chicken)

During 1986, 87 records from 11 contributors for 60 taxa have been received. There were two main sources. One continues to be fields where wool shoddy has been used, though D. Martin reports a decreasing usage of this material in the Wakefield area with obvious effect on the number of aliens found. He also notes that *Sisymbrium irio* L. appears to have become established on one headland. The other source is roadside verges where garden waste has been deposited and horticultural plants have become established. Garden plants in long neglected sites are entered in the card index, but are not listed here if it is thought they have not spread an appreciable distance. Numerous records of Japanese Knotweed and Snowberry continue to come in. A selection of the records is given, mainly of those species not reported in a given vice-county during the last five years. Unless stated otherwise, the contributor is taken to be the determiner.

Matteuccia struthiopteris (L.) Tod. (64) Bank of R. Ure, Bishop Monkton 44/36; D. J. Tennant per L. Magee.
Aconitum bicolor L. (64) Roadside, Forest Moor 44/15; Mrs F. Houseman det. D. McClintock.
Montia perfoliata (Donn ex Willd.) Howell (63) Rossington Bridge, Doncaster 43/69; Mrs D. Bramley per D. R. Grant.
Montia sibirica (L.) Howell (63) Cullingworth 44/03; T. Schofield via D.R.G.
Geranium endressii Gay × *G. versicolor* L. (64) Clapham 34/76; F.H.
Geranium ibericum Cav. (64) near Thruscross Reservoir 44/15; F.H.
Impatiens capensis Meerb. (63) East side of Castle Howard Lake 44/77; L.M.
Laburnum × *watereri* Dipp. (64) Edge of plantation, Weston near Otley 44/14; F.H. det J. Palmer.
Melilotus alba Medic. (61) old gravel pit, Emmotland 54/05; E. Chicken.
Rosa multiflora Thunb. (61) Hedge at Cherry Burton 44/94; E.C.
Cotoneaster bullatus Bois. (64) Ben Rhydding gravel pits 44/14; F.H. det. Dr A. Leslie.
Tellima grandiflora (Pursch) Dougl. ex Lindl. (65) The Belt, Well 44/28; F.H.
Ribes sylvestre (Lam.) Mert. & Koch (64) Roadside at Pannal 44/35; F.H.
Epilobium pedunculare A. Cunn. (63) Near Digley Reservoir, Holmfirth 44/10; D.R.G.
Eryngium bourgatii Gouan (64) Ben Rhydding gravel pits 44/14; F.H.
Nymphoides peltata (S. G. Gmel.) Kuntze (64) Lagoon at Ben Rhydding 44/14; F.H.
Lamium maculatum L. (65) The Belt, Well 44/28; F.H.
Centaurea montana L. (65) Woodland by roadside, Well 44/28; F. H.
Hemerocallis fulva (L.) L. (64) Roadside, Forest Moor 44/15; F.H.
Acorus calamus L. (63) Southfield Reservoir near Goole 44/61; E. Thompson via D.R.G.
Bromus tectorum L. (63) Field side, Mickletown 44/42; Mrs E. Bray det. E.C.

BOOK REVIEW

Climate and Plant Distribution by **F. I. Woodward** (Pp. xii + 174; £22.50 hardback, £8.95 paperback) and **The Ecology of the Nitrogen Cycle** by **Janet I. Sprent** (Pp. viii + 151; £22.50 hardback, £8.95 paperback). Cambridge Studies in Ecology. Cambridge University Press. 1987.

Two more titles in this well-chosen series on ecological studies, which on account of their concise coverage of each subject area will prove most helpful to undergraduates; furthermore, the extensive literature coverage afforded by their bibliographies extends the books' usefulness to researchers, teachers in higher education and professional ecologists generally. The texts, well supported by diagrams, graphs and tables, say practically all that needs to be said in this context, both paying particular attention not only to general processes and current thinking, but also cover areas often neglected in comparable works.

MRDS

BEARDED TIT

Photo: Arthur Gilpin

Known as the Bearded Tit or Bearded Reedling, and because of its long tail and foxy-red colour, called Reed Pheasant by the older East Anglian marshmen, this species is one of Yorkshire's loveliest small birds. The bright yellow iris of its eye sets it apart from other birds of similar size.

Before 1911, when an attempt was made to introduce the species to Hornsey Mere, there were very few records of it being seen in the county. The imported birds bred and at first it seemed that the introduction would be successful, but at the autumn meeting of the YNU Vertebrate Section in 1914, it was reported that the experiment had failed. Forty-five years later eleven Bearded Tits were seen at Spurn, and it is probable that within the following decade breeding commenced in reedbeds by the Humber shore. In addition, this species has become a regular winter visitor to the county and their numbers sometimes reach invasion proportions.

BOOK REVIEWS

Thorne Moors Papers, edited by **M. Limbert**. Published by Doncaster Naturalists' Society, 1987. vi + 87. £2.50.

After a half century of comparative neglect, the natural history of the peatlands between Thorne, Goole and Crowle has received increasing attention from naturalists. The results have been published in a series of papers in the journals of the Yorkshire Naturalists' Union, Sorby Natural History Society, Doncaster and District Ornithological Society and Doncaster Naturalists' Society. The fauna has received most attention and the birds and insects have been the subject of separate publications produced by DDOS and SNHS respectively, reviewed here recently.

The present publication contains seven papers on the physical characteristics and botany of Thorne Moors. The first paper, on 'The Geology and Landscape Development of the Area Around Thorne Moors' by G. D. Gaunt, is a masterful acount of the way in which the preglacial rocks and the glacial and postglacial deposits have been laid down and eroded to give the conditions we see today. This article also deals with the alterations which man has effected on this landscape, a theme which is also dealt with in 'Some Notes on the Landscape History of Thorne Moors' by Martin Limbert. These two papers include bibliographies on the geological and human influences on this area. The other papers bring the botanical information up to date. Martin Limbert's 'Provisional Bibliography of the Thorne Moors Flora' draws together all the publications so far traced which refer to this area. The non-flowering plants are next reviewed in a series of four papers – 'An Annotated Checklist of Thorne Moors Bryophytes' by Colin Wall and Martin Limbert, 'Mycological Records from Thorne Moors' by Robert Taylor,'An Annotated List of Thorne Moors Lichens' by Brian Eversham and 'Charophytes from Thorne Moors' by Martin Limbert. These papers have rather different approaches, some dealing with the ecological aspects while others concentrate on the historical records. Tighter editing to give a more uniform result would have been an advantage.

This publication looks like a journal and is titled like a journal, but it is clearly intended to be a separate booklet and carries an ISBN number. If the existing journals are unable to cope with the flow of papers which the workers on Thorne Moors are generating then this seems an odd way of publishing the results, compared with the formats chosen for the recent reviews of the birds and the insects.

WEA

Northumbria: a collection and a recollection, with photographs by **David Bell** and text by **Brian Redhead**. Pp. 200, with full colour illustrations. Constable. 1987. £14.95.

This book will give much pleasure to those already familiar with this beautiful region, and will encourage others to make its acquaintance at an early opportunity. A wide selection of evocative photographs bear eloquent testimony to its natural beauties and historical heritage, but does not flinch from also recording the urban and industrial impact on the landscape.

Cuckoo Hill – the Book of Gorley by **Heywood Sumner**. Pp. 180, with numerous full-colour and a few sepia illustrations. Dent. 1987. £12.95.

This is a fascinating book, which describes the lovely country of the New Forest and Cranborne Chase as it must have looked before the first World War, during the period from 1904 to 1909. A detailed account of the author's brick-by-brick conversion of an old tumble-down cottage into an extremely gracious country home is part of its theme. By the end of the five years it took him to complete it, Heywood Sumner had become steeped in the natural history, archaeology and life of the area.There are some interesting

snippets of conversations with the cottage folk in the Hampshire dialect of years ago, expressing their outlook on life as they saw it within such a narrow community. This, together with his lovely delicate watercolour paintings, reproduced in superb facsimile, makes for an unusual but charming and relaxing account of a country way of life that has long since vanished.

Cuckoo Hill can be recommended as an ideal book at bedtime.

MET

The Brightest Jewel: a History of the National Botanic Gardens Glasnevin, Dublin by **E. Charles Nelson** and **Eileen M. McCracken**. Pp. xiv + 275, with coloured plates, b/w photographs and illustrations. Boethius Press, Clarabricken, Clifden, Co. Kilkenny. 1987. £30.00.

The title, taken from the description of these Gardens by Walter Wade (Glasnevin's first Professor of Botany, appointed nearly 200 years ago) as 'the brightest jewel in Dublin's cap' is still an apt description of one of Ireland's greatest treasures.

Two of Ireland's most respected botanical historians have collaborated to produce a most fascinating, informative and thoroughly attractive account of Glasnevin's world famous Gardens. The lives and influence on the Gardens of its Curators and Directors are highlighted, particular attention being paid to David Moore, in charge from 1838 to 1879, and his son, Frederick William Moore, who took over on his father's death, remaining in office until his retirement in 1922.

As well as providing a history of the Gardens and their personalia, considerable attention is given to the plants and to the botanical excursions which supplied them; some of the choicest items connected with the Garden, including a selection of those plants which Glasnevin supplied for reproduction in *Curtis's Botanical Magazine*, are illustrated in full colour (some specially commissioned for this book from Wendy F. Walsh). The final section of the book brings Glasnevin's story up to date. Long may it continue to flourish!

MRDS

Britain's Natural Heritage by **Phil Colebourn** and **Bob Gibbons**. Pp. 240, with many colour and b/w plates, maps, diagrams and tables. Blandford. 1987. £14.95.

This book is both visually attractive and factually informative, showing how many aspects of the British landscape can be interpreted through its natural history. The text is lavishly supported by maps and excellent coloured illustrations to show how particular habitats result from specific factors. Thoroughly recommended, particularly at this very reasonable price.

Butterflies of the British Isles – The Nymphalidae by **Michael Easterbrook**. Pp. 24, with 3 black and white and 28 colour photographs and 8 line drawings. Shire Publications. 1987. £1.25, paperback.

In spite of its narrow field, this is not a book for the specialist. It covers those nymphalid butterflies most often encountered in Britain, categorizing them simplistically into three groups according to preferred habitat. Brief, rather vague descriptions of ova, larvae and imagines are given, as well as broad details of habit, habitat and regional distribution. Adults of all species are shown in superb colour photographs, all except two shown in natural situations, and excellent line drawings emphasize critical differences between fritillaries. Six larvae are also depicted in colour, while two of the black and white photographs and three drawings illustrate enlarged ova.

At the end there is helpful advice on observing, rearing and recording and a short list of further reading. Apart from the inevitable shortcomings of condensed information, this really is a first class little book for beginners, written in a popular style and available at a very reasonable price.

PQW

Marine Conservation Society's Guide to Inshore Marine Life by **D. Erwin** and **B. Picton**. Pp 120, with 200 colour plates. Immel Publishing. 1987. £9.95.

This book is a guide via colour photographs of the most common and conspicuous species of animals and plants, in their natural habitats, to be found in shallow waters around our coasts. Much of the information comes from volunteer divers and it is a book for the beginner or enthusiast without formal training. Just under 200 species are displayed so coverage is not comprehensive. The book tries to answer two main questions: what is the name of the organism and the group to which it belongs, and where does it live, on what sort of bottom and at what depth. The pages for each group are colour-coded for easy reference. Surrounding the photograph of each organism is coded information about how deep it is found (5 grades), its size (3 grades), type of bottom and habitat characteristics (7 types) and wave action (5 grades). In addition, information on distributional status, feeding habits, etc. is often given, and a further reading list is added. A very handy guide.

MEA

Observing Marine Invertebrates. Drawings from the Laboratory by Donald P. Abbott. Edited by G. H. Hillgard. Pp. xxiv + 380. Stanford University Press. 1987. Spiral binding.

This rather unusual book has a mere five pages of text, comprising the author's preface and the editor's introduction, the rest being many hundreds of detailed line drawings of marine invertebrates ranging from *Hydrozoa* to *Crustacea*, *Polychaeta* to *Amphipoda*.

Most of the drawings are Dr. Abbott's own work (only 26 of the hundreds published are attributed to his students). The originals were intended as an introduction to marine invertebrates for Dr. Abbott's classes in marine biology given at the Hopkins Marine Station of Stanford University, California. In his own words, the author regarded his sketches as 'incomplete "plumbing and wiring" diagrams' designed to stimulate the students to improve upon them by observing the actual organisms both in the field and in the laboratory.

Serious students of marine biology will no doubt find much useful information in this book, although, because of their Pacific Ocean origins, some of the species depicted might be unfamiliar. To the average amateur naturalist however, it will prove of marginal interest, since it is clearly designed neither for species identification, nor as an introduction to sea shore ecology. The spiral binding, whilst having the advantage of allowing the book to be opened completely flat on the laboratory bench, has the disadvantage that pages can easily tear along the spine. The review copy had the title-page almost detached on receipt.

JKS

Arthur Whitaker's Bats, edited by **Derek Whiteley**. Published by the Sheffield Bat Group. (Reproduced by permission of the Yorkshire Naturalists' Union.) Available from the Sheffield Bat Group, 730 Ecclesall Road, Sheffield S11 8TB, price £2.

This 80-page booklet comprises a preface and biographical introduction, followed by a series of papers first published by Arthur Whitaker in *The Naturalist* between 1905 and 1913.

In recent years, we have often heard it stated that old records and the work of old recorders are of little use. These well written and well observed papers by Arthur Whitaker are as relevant today as when first published, and his pioneer work on Yorkshire bats has never been bettered. Due to the dramatic fall in the number of bats found in the wild in recent years, some of the experiments and observations carried out by Whitaker and his fellow pioneer workers can no longer be repeated, and much of our current knowledge is therefore dependent on these early publications.

The Sheffield Bat Group is to be congratulated for republishing this excellent series of papers for dissemination to a wider readership.

AN

The Adder by **Peter Stafford**. Shire Natural History Series, no. 18. Price £1.25.

An attractively produced, lucid, well illustrated account of the adder, a very good introduction to the species, and excellent value.

I would have liked more detail in certain areas, and whilst space is at a premium, I consider the full page taken up by the chapter 'Adders in folklore' and the paragraphs again drawing attention to the myths about female adders swallowing their young to be an unfortunate waste of valuable space.

The booklet does contain some generalisations which I would question, as they do not coincide with my own observations of adders in the field of Yorkshire, e.g. the author's reference to the minimum level of air temperature necessary before an adder will leave hibernation. Such discrepancies should not be allowed to detract from, or put a potential purchaser off, what I consider to be a very readable, good value publication which I do recommend.

However, for the reader wanting a more detailed and valuable study, I would recommend more highly, from the limited further reading available, Prest, I. (1971) An ecological study of the viper *Vipera berus* in southern Britain, *Journal of Zoology* **164**: 373–418.

DA

Nature Detective by **Hugh Falkus**. Pp. 256 with 8 colour plates and over 200 black-and-white photographs. Witherby. 1987, 2nd edition. £14.95.

This book shows how the art of reading animal tracks can add much to the enjoyment of the countryside, and can become an absorbing pastime. The tracks and signs of animal activities are carefully and beautifully illustrated with many black-and-white photographs. The book is intended for the general reader interested in natural history. The first part of the book deals with animals of coastal dunes, estuaries and seashore. The behaviour and habits of birds, toads, foxes, rabbits, hedgehogs and even flounders are given plus Niko Tinbergen's experiments to explain the presence of empty egg-shells away from the nest. It is further suggested that the disappearance of black-headed gulls and terns from Ravenglass Nature Reserve is mainly due to predation by foxes. The second part deals with animals of the countryside, and portrays woodpeckers, badgers, otters and other pond animals, moles and deer. This is a beautifully produced book which in its second edition will continue to bring delight and pleasure to many people.

MEA

Charles Darwin's Natural Selection, being the second part of his big species book written from 1856 to 1858, edited by **R. C. Stauffer**. Pp. xii + 692. Cambridge University Press. 1987. £19.50 paperback.

A welcome reissue in paperback of this crucial scientific text, first published in 1975. Edited from Darwin's original manuscript, which formed the basis of his most famous published work, with supporting background information and index by Stan P. Rachootin and Sydney Smith, this provides a most timely companion volume to CUP's prestigious edition of Darwin's Correspondence (see *Naturalist* **111**: 36 and **113**: 24).

Wild Flowers in Danger by **John Fisher**. Pp. 194, illustrated in colour. Gollancz. 1987. £12.95.

The author is a journalist who has worked for most of his life as a foreign correspondent, and his book is a personal selection of about 100 species of British wild flowers, 75 of which are illustrated by colour photographs. He divides them into groups: the rarest, the endangered, threatened plants of wetlands, and so on. Fisher is a rather garrulous writer, although he doesn't say much by way of description of his chosen plants. Maybe he feels that his photographs, which however, by the standards we have become used to in recently published popular flower books, are only moderate, are

sufficient in this respect. He has little to say about life histories or ecology either. Much of his text is amusing gossip, some of it quoted from recent writers on wild flowers, especially David McClintock, or from Gerard and other older writers, although he makes use of less familiar sources too. At the end of the book he lists the species scheduled in the Wildlife and Countryside Act (1981), gives notes on map-reading and flower photography, and a list of 'useful addresses' with a more detailed notice of the Wild Flower Society. In a reference to the Botanical Society of the British Isles (which is, of course, a serious scientific organization) he remarks that people join it because they like to be 'in the know'. Readers with this motivation will find his book of interest, though they may feel that it does not go into sufficient detail of the plants or of the localities.

FHB

A New Key to Wild Flowers, by **J. Hayward**. Pp. 278, with over 600 line drawings. Cambridge University Press. 1987. Hard covers £25, paperback £8.95.

This simplified key for the identification of wild flowers based on field courses run by the author and employing a minimum of technicalities is said to have had its accuracy extensively tested in Field Study Centres. It must therefore be assumed to work satisfactorily for most British species. The clear marginal illustrations accompanying the key characters are certainly very helpful aids to identification. However, the snags which always arise in constructing such keys have not all been ironed out and there are a number of weak couplets or statements which will need amending in any future edition. Thus *Crepis paludosa* appears both under 'Pappus white' and under 'Pappus pale brownish (not white)', yet the latter is always the case. It is not always the case however that *Cirsium acaule* is stemless although no alternative is available here. One of the key characters of *Rumex sanguineus* is 'not confined to woodlands' which implies that some species (presumably those standing close to it in the species sequence) *are* confined to woodlands, yet no woodland species of *Rumex* is mentioned. In *Galium palustre* the marginal teeth on the leaves are correctly referred to as pointing backwards but the user will be perplexed by the accompanying drawing which shows them all pointing forwards! Identification within certain difficult species groups in such genera as *Potamogeton*, *Carex* and *Bromus* will probably be no more than tentatively resolved but the key is likely to provide a quick answer to most identification problems and an approximate answer to others which may then be decided by reference to standard floras.

WAS

Gaia. A New Look at Life on Earth by **J. E. Lovelock**. Pp 154. Oxford University Press. 1987. £4.96 paperback.

Gaia, or Mother Earth as named by the Greeks of 2000 years ago is a most enthralling look at life on Earth from its very beginning up to the present day. It is a journey through time and space showing very clearly how the life of earth functions as a single organism which actually defines and maintains conditions necessary for survival. First published in 1979, and this reprint speaks well for the book's continued popularity with those who have a scientific background or not.

MET

CORRECTION: DATE OF THE STAR CARR MESOLITHIC BIRDS

I regret that in re-examining the bird bones from Star Carr (*Naturalist* **112**: 141) I quoted an incorrect date for the site. Radiocarbon dates are now given in accordance with the international radiocarbon convention as radiocarbon years before the present (b.p.); the year 1970 being treated as the present for this purpose. When I was given the radiocarbon date c.7,500 for Star Carr I was not aware that it had earlier been 'corrected' to B.C., and the dating would in fact be c. 9470 b.p. (or perhaps c. 9,500 for convenience).

Colin J. O. Harrison

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The Naturalist

A QUARTERLY JOURNAL OF NATURAL HISTORY FOR THE NORTH OF ENGLAND

James Clark Ross and Ross's Gull – a review — *Michael Densley*

Recolonization of burnt and cut heathland in the North York Moors by arachnids — *Michael B. Usher and Lesley M. Smart*

West Moor and its botanical records — *Martin Limbert*

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

Photographic Plates

Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

Notice to Contributors to 'The Naturalist'

Manuscripts (two copies if possible), typed double-spaced on one side of the paper only with margins at top and left-hand at least 2.5 cm wide, should be submitted. Latin names of genera and species, but nothing else, should be underlined. S.I. Units should be used wherever possible. Authors must ensure that their references are accurately cited, and that the titles of the journals are correctly abbreviated. Volumes of *The Naturalist* for the years 1886 to 1975 have been retrospectively numbered 11 to 100 to accord with numbering before and after this period (see YNU *Bulletin* no. 3, pp. 21–22, 1985); please cite these volume numbers in all references. Tables and text-figures should be prepared on separate sheets of paper. Drawings and graphs, drawn about twice the linear size they are to appear, should be in jet-black Indian ink, and legends should not be written on the figures.

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JAMES CLARK ROSS AND ROSS'S GULL – A REVIEW

MICHAEL DENSLEY

Presidential Address presented to the 126th Annual General Meeting of the Yorkshire Naturalist's Union in Leeds on Saturday 5 December 1987.

In the years from 1815 to 1817, whalers returning from the Arctic reported that vast sheets of ice and icebergs were moving south into the Atlantic. For centuries, the ice barrier had stretched from the east coast of Greenland to the north of Spitzbergen, preventing any material penetration into the Arctic Ocean; now it had begun to shift.

William Scoresby the Younger was one of the most noted whalers of this period. He was born near Whitby, and in addition to his whaling activities, he gained a reputation as an explorer and scientist. In 1825 he took up Holy Orders and eventually became Vicar of Bradford.

During his 1817 whaling voyage to Greenland, Scoresby had observed that an area of the Greenland Sea about six times the size of Western Europe was clear of ice, all of which had disappeared during the previous two years.

John, later Sir John Barrow, Second Secretary of the Admiralty was persuaded by Scoresby, correctly, that Greenland was an island, and that the time was ripe to make another try for the long sought North-West Passage, the sea route over the top of the North American Continent from the Atlantic to the Pacific.

The combination of a peacetime navy with ample ships and men available, and the southward drift of Arctic ice presented Barrow with the ideal time to renew the ancient search. However, although the discovery of the Passage would be a contribution to geographical and scientific knowledge and a source of national prestige, it was no longer considered a practical commercial sea route to China.

The man chosen by Barrow to command the 1818 North-West Passage expedition was Captain, later Sir John Ross, eventually one of the most distinguished naval officers of his day, and one of the greatest authorities on Arctic navigation.

With John Ross on the expedition was his eighteen-year-old midshipman nephew James Clark Ross, the central figure of this review. Born in 1800, James was the third son of John Ross's eldest brother George and his wife Christian Clark. George Ross became moderately successful in business as a merchant and moved from the family home in Wigtownshire to Finsbury Square in London, from where, shortly before his twelfth birthday, James left to follow his favourite uncle into the navy.

James's specific duties on this, his first voyage to the Arctic, were to make scientific observations at sea and take samples from the ocean bed, to make notes on the natural history and native peoples of the area, and to collect specimens of animals both for scientific purposes and as fresh meat for the crew.

The expedition left the Norfolk coast on 25 April 1818, reaching the southern tip of Greenland four weeks later. They were finally halted by a solid wall of ice, and voyaged south along the western shores of Baffin Bay, where Edward Sabine, the ship's astronomer, collected a gull then new to science, later named Sabine's Gull after him. The two ships returned safely to London on 11 November.

The next attempt on the Passage was led by John Ross's second-in-command on the earlier voyage, William Edward Parry, and nearly all the officers and men of Ross's 1818 expedition volunteered for the 1819 voyage. Many were re-engaged, including James Clark Ross as midshipman.

The voyage was the most successful ever made by a sailing ship in the Arctic, penetrating halfway through the North-West Passage and thoroughly charting the coastline they encountered. The expedition arrived back in the Thames on 20 December 1820.

In early May 1821, only four years later, Parry and James Clark Ross were on their way to the Arctic again, once more in search of the Passage, with Parry once more in

command. A new face was Francis Rawdon Moira Crozier, who was to accompany James Ross on most of his major voyages, and who became his closest friend.

On this voyage, James Ross was made responsible for looking after the collection of stuffed birds and mammals, and the botanical and mineral samples collected by various members of the crew. Ross also exercised his growing expertise in the field of terrestrial magnetism. The expedition spent its second winter, 1822/23, at Igloolik, a small island off the north-east coast of the Melville Peninsula, opposite a mainland Eskimo settlement known as Alagnak or Arlagnuk.

At Igloolik Parry records in his journal for Wednesday 2 July 1823:

> On June 23rd. Mr Ross procured a specimen of a gull having a black ring around its neck and which, in its present plumage, we could not find described. This bird was alone when killed, but flying at no great distance from a flock of (Arctic) terns, which latter it somewhat resembles in size as well as its red legs; but it is on closer inspection easily distinguished by its beak and tail, as well as by a beautiful tint of most delicate Rose colour on its breast.

The winter ice released the ships from Igloolik in early August 1823 and, unwilling to spend a third winter in the Arctic, Parry set sail for home on 12 August.

Parry's third and final attempt at the Passage was even less productive than his second. Again with James Ross among the crew, this time as accredited naturalist, the expedition left England on 19 May 1824, spending the following winter on the eastern shore of Prince Regent Inlet. Parry was reluctant to face a second winter in the ice and decided to head for home the following spring, reaching Peterhead in Scotland on 12 October 1825.

The lack of further progress through to the Pacific disinclined the Navy to pursue the North–West Passage project further, and interest began to switch instead to the other great unattained prize of the Arctic, the North Pole.

Parry proposed and received approval for a plan to attempt the Pole by sailing to Spitzbergen and thence crossing the ice on foot, with sled-drawn boats. James Clark Ross was to accompany him.

Leaving Essex on 4 April 1827, the expedition sailed directly to Norway, encountering their first sea-ice in Spitzbergen waters on 5 May. The expedition's ship, the *Hecla,* was berthed in what is now called Sorgfjord, from whence Parry, James Ross and ten men with two boats on sleds left on 23 June to try for the Pole. On the journey north they encountered two of the mysterious Ross's Gulls.

On 26 July, Parry calculated that they had travelled ten or eleven miles north across the ice, but had actually drifted with it thirteen miles to the south. The furthest north they achieved was a record that was to stand for fifty years. Reluctantly Parry decided to head south, and on the way back to the ship Ross recorded sightings of two more Ross's Gulls. Safely reaching the *Hecla* in the late afternoon of 21 August, they set sail for London one week later.

A little over four weeks after their return, James Clark Ross was promoted to the rank of Commander. John Ross was still determined to try again for the North–West Passage and, lacking Navy backing, obtained funding for a private expedition from a wealthy gin manufacturer, Felix Booth.

In 1828 he purchased a modified steam packet vessel, the *Victory,* and appointed his nephew, James Clark Ross as his second-in-command. During the voyage north, before the ship's doctor had joined the ship, a stoker had his arm shattered after falling into the engine machinery. Using the doctor's instruments, which were already on board, James Ross promptly carried out a successful amputation, saving the man's life.

At eight o'clock in the morning of 1 June 1831, James Ross arrived on foot at the North Magnetic Pole, the first man ever to do so. At the time this point lay on the west coast of the Boothia Peninsula, named after John Ross's benefactor. Ross's achievement was subsequently acclaimed in a popular ditty of the day, 'Sir James Clark Ross, the first whose sole, stood on the North Magnetic Pole'. John Ross, however, was not happy

to have this important discovery attributed solely to his nephew, and the issue was the source of serious dispute and ill-feeling between the two men for some time.

After three winters in the ice the *Victory* had to be abandoned on 29 May 1832, and the men were rescued by the Hull whaling ship, the *Isabella,* in August the following year. News of their rescue and of the discovery of the North Magnetic Pole had preceded them. On their arrival in Hull, John Ross was given the Freedom of the City. Among

PLATE 1

Portrait of James Clark Ross as a young man of 33 years of age in naval uniform. Painted by John. R. Wildman in 1833-34, the portrait is now in the collections of the National Maritime Museum at Greenwich, and reproduced here with their kind permission.

many other honours, he was also later awarded a Knighthood and made a Companion of the Bath.

James Clark Ross was promoted to the rank of Post Captain, and in 1834 given the responsibility by the Admiralty for the first systematic magnetic survey of the British Isles (Plate 1).

In 1835 the country was alarmed to hear of the plight of eleven Hull whaling ships and 600 men trapped in the ice off western Greenland. As the Navy's most experienced officer in Arctic travel, James Clark Ross was the obvious choice to lead the rescue attempt. For this purpose, Ross chose the Whitby ship the *Cove* to sail in, and appointed as his First Lieutenant his old friend and companion of many voyages, Francis Crozier.

Before Ross set sail, on 6 January 1836, two of the supposedly trapped whalers had arrived in Hull, with news of six more on the way. Three more were still apparently trapped.

Ross reached Labrador by early April where he learned that just one ship remained trapped, the *William Torr.* Ross scoured the west coast of Greenland for almost four months, and by early August concluded that he had done all that could be done. The *Cove* arrived safely back in Hull at the end of August 1836 to a hero's welcome from the grateful city.

Four years later it was learned from the local Eskimos that the *William Torr* had been crushed by the ice and gone down with all hands in December 1835, before Ross had even set sail.

Three years later, the Government mounted an expedition to make a detailed magnetic survey in the area between the southern tip of South America and Australia. Having just completed his magnetic survey of the British Isles, and with his unrivalled experience of Arctic travel, James Clark Ross was appointed both leader of the expedition and its scientific head.

Ross and his men left Cornwall on 5 October 1839 and were away from England for four and a half years. The expedition was spectacularly successful in all its objectives, and Ross was awarded the Founders Medal of the Royal Geographic Society and the Gold Medal of the Royal Geographic Society of Paris. For the second time he was also offered a Knighthood, which this time he accepted, and in 1844 was awarded an Honorary degree by Oxford University.

This epic Antarctic voyage marked almost the end of James Clark Ross's polar travelling and it is at this point that we transfer our attention, for the time being, from the man to the gull he discovered twenty years earlier in the Canadian Arctic – Ross's Gull.

In October 1823, the collections of natural history material amassed on Parry's voyages were handed over to specialists to describe and catalogue. The task of processing the bird collections, including the as yet un-named gull collected by Ross, was to be undertaken by Dr John Richardson, an eminent naturalist of his day.

Richardson recognised Ross's bird as a species new to science, and proposed to name it *Larus rossii,* Ross's Gull (Plate 2), in honour of its discoverer. The formal description and naming of the specimen would form part of the zoological appendix Richardson was preparing to accompany Parry's narrative account of his 1821–23 expedition.

As Dr Richardson was working on his zoological appendix for Parry's work, William MacGillivray, a well known ornithologist and zoological assistant at the Edinburgh University Museum, was preparing a review of the then known species of gulls. MacGillivray was aware of and had access to Ross's specimen of this new gull, and also knew of Dr Richardson's naming and publishing plans.

In 1824, before Parry's account, and with it Dr Richardson's zoological appendix, had appeared in print, MacGillivray completed his gull review and decided to publish it. His only reference to Ross's Gull is as follows:

> . . . with regard to the tail there are two remarkable exceptions; the one the *Larus Sabini* (Sabine's Gull), the other *L. roseus (Larus roseus),* in which it is subcuneate, the middle feathers being considerably longer, the rest graduated.

It seems clear that MacGillivray had not intended to give a permanent name to Ross's bird; he simply wanted a temporary peg to hang it on so that he could discuss it. Nevertheless, under the strict rules of zoological nomenclature, which MacGillivray must

have understood as well as anyone, he had 'published' the species when he described the specimen and gave it a binomial name in print. Nothing he or anyone else could do could ever change it. It is said that this premature naming caused considerable bad blood between Richardson and MacGillivray at the time, but if MacGillivray was guilty of any crime it was probably that of carelessness.

The name as adopted now, *Rhodostethia rosea,* was first used by Bruch in the *Journal für Ornithologie* in 1853.

PLATE 2

Adult Ross's Gull at the nest in the delta of the Kolyma River, East Siberia, in June 1978/79. The delicate black collar of the summer-plumaged adult is well shown, as is the nest situation – drier areas in Carex marshes near the river and the larger lakes. This nest site is probably in a drier situation than most.
Photograph courtesy of A. V. Andreev.

James Clark Ross's original (and type) specimen still exists in the collections of the Royal Museum of Scotland in Edinburgh, where I examined it in 1974.

An interesting footnote to this account of the naming affair came to light recently. A mineralogist, Karl Ludwig Giesecke brought back a specimen of Ross's Gull from west Greenland, and presented it to the Hofmuseum in Vienna, where it was certainly in their collections in 1818, and is still there.

The Curator at the time described it in the accessions register as 'L. collaris', obviously *Larus collaris,* which translates as Collared Gull. Had that name been properly published with a description it would have taken precedence over MacGillivray's controversial naming in 1824.

The bird could not have been collected by Giesecke later than 1813, the year he left

Greenland; Giesecke's bird thus predates that of Ross by ten years, and there is evidence in the early literature of the country to suggest that Ross's Gull may have been recorded in Greenland as early as 1765.

Fifty years after its discovery, Ross's Gull was still little more than a legend, with very few specimens in collections and no-one yet having seen a flock or even hearing of a nest. It was then, and in some ways still is regarded as one of the most mysterious birds in the world.

The Arctic has always exerted a great fascination for travellers and over the next thirty years many explorers and naturalists pursued the bird amid the ice of the Arctic Ocean, eventually to its breeding grounds in north-east Siberia. The hardships associated with the search involved some of the greatest examples of courage, endurance and self-sacrifice ever recorded in the field of human endeavour. Equally, the prestige of having one's name in some way linked with the bird, and the desire to possess its skin or eggs brought out many of the worst traits in the human character – greed, envy, malice, deception and probably even criminality.

For some years, James Gordon Bennett, a wealthy American, had harboured a desire to reach the North Pole, and with this goal in mind he purchased the steam yacht *Pandora.* The American Navy adopted Bennett's plan and his ship, renamed her *Jeannette,* agreed to crew her and appointed Lieutenant George W. De Long as her new master.

The *Jeannette* steamed out of San Francisco harbour in the afternoon of Tuesday 8 July 1879. On 4 September she arrived at Herald Island off the north-east coast of Siberia. Two days later she was trapped in the ice.

For the next two years the ice slowly carried the *Jeannette* westwards as far as the New Siberian Islands where, on 13 June 1881, she was crushed and sank. Before she went down, the crew has started to head south across the ice and open water towards the Siberian coast, dragging small boats with them.

Fourteen men, including the Captain, died in the struggle, but twenty-nine were saved, including the ship's naturalist, Raymond Lee Newcombe. In his journal, Newcombe records that he shot five Ross's Gulls in the ice off Herald Island on 14 October 1879. He and others subsequently obtained at least three or four more in June and July the following year. It is to Newcombe's credit that, having lost everything else when the *Jeannette* went down, he managed to carry three of his precious Ross's Gull skins back to civilization, preserved under his shirt.

An interesting sequel to this story came to light in 1884, three years after the tragedy. Clearly identifiable items of wreckage from the *Jeannette* were found washed up on a beach at Cape Farewell on the southern tip of Greenland three thousand miles away across the top of the world.

As the crew of the *Jeannette* were struggling across the ice towards the safety of the Siberian mainland, the American International Polar Expedition of 1881–83 were settling in at Point Barrow on the north coast of Alaska.

John Murdoch was one of the naturalists with this expedition, and as he walked along the beach at Point Barrow on 28 September 1881, several flocks of small, graceful gulls passed him offshore, flying north-east, some of them showing a rosy hue underneath as they turned in the sun. Murdoch quickly realised they were Ross's Gulls, and the birds continued to pass in large numbers for about a month. None was seen in spring or summer, so clearly the birds did not breed near Barrow.

The birds appeared again the following September, with thousands passing offshore in October. The expedition took many specimens, in Murdoch's works 'more than existed at that time in all the museums of the world'.

George De Long's ill fated expedition with the *Jeannette* captured the imagination of many at the time, none more so than the Norwegian naturalist/explorer Fridtjof Nansen. The aspect of the *Jeannette* tragedy which most intrigued Nansen was the discovery of debris from her three years later in southern Greenland, and the evidence it revealed of a trans-Polar current.

He was confident he could design and build a ship which, under pressure from the ice would rise above and subsequently rest upon it. Suitably provisioned, the inhabitants of such a ship, Nansen reasoned, could survive aboard her indefinitely. Further, if she were deliberately placed in the ice at the point where the *Jeannette* went down in 1881, might not the ocean currents carry her and the ice across the Arctic Ocean to southern Greenland, as they had earlier carried the wreckage from the *Jeannette,* on the way perhaps passing near enough to the North Pole to be able to mount an asault on it?

Such an ingeniously designed wooden ship, the *Fram*, was constructed, and on 29 September 1893 she reached a point two hundred miles west of Kotelny Island, the largest of the New Siberian Islands, off the mouth of the Lena River. It was here that the *Jeannette* had foundered twelve years earlier.

The *Fram* was immediately deliberately steered into the ice and allowed to drift with it for the next three years until she broke free of her own accord, unscathed, off the coast of north-west Spitzbergen in August 1896, 1041 days after she had last sighted land.

In March of the year prior to the *Fram*'s release, Nansen and a companion left the ship with sledges to make an attempt on the North Pole. They reached their farthest north on 7 April 1895 when, like Ross and Parry in 1827, they realised that the ice was carrying them away from the Pole faster than they could advance on foot. They were reunited with them the *Fram* at Tromsö on 26 August 1896, from whence they returned to Oslo as heroes.

Between 3 and 8 August 1894, almost halfway between the Lena delta and the North Pole, the expedition collected eight specimens of Ross's Gull, and as an indication of the allure still exerted by this legendary bird, on 3 August 1894 Nansen entered into his diary 'Today my longing has at last been satisfied, I have shot Ross's Gull. This rare and mysterious inhabitant of the unknown north, which is only occasionally seen, and of which no-one knows whence it came or whither it goeth, which belongs exclusively to the world to which the imagination aspires, is what I have always longed to discover'.

The expedition saw several more Ross's Gulls in the pack ice in July and August 1895, and also found great numbers of them in early August off the coast of northernmost Franz Josef Land.

On her way back to Norway, the *Fram* called in at Danes Island in north-west Spitzbergen, where the crew encountered the Swedish explorer Salomon A. Andrée who, with two companions, was preparing an assault on the North Pole using a hydrogen-filled balloon.

Andrée and his two companions left Danes Island in their balloon in the afternoon of 11 July 1897, on a journey which seems to have been doomed from the start. After a number of mishaps, the balloon made its final descent onto the Polar ice three days later, having travelled only 350 kilometres north from its point of launch.

The three men struggled south over the ice until they reached the barren shores of White Island in east Spitzbergen, almost three months later, where they all died. Andrée kept detailed notes of his ornithological and other natural history observations, and he saw his first Ross's Gull on 25 July. During the rest of the month he saw a total of at least fifteen and probably as many as seventeen birds.

The journals left behind by the dead men, and their films, which were processed thirty-three years after their exposure, revealed the full horror of their ordeal.

Ten years after Nansen's celebrated Drift expedition, in May 1905, the Russian naturalist and explorer Sergei A. Buturlin embarked on an exploration of the Kolyma River, in north-east Siberia, by dog team. Here, at the edge of the treeline, in the remote, boggy tundra, and not on the barren Arctic Ocean shore, Buturlin at last discovered the real breeding grounds of the Ross's Gull.

Buturlin spent the whole of the 1905 breeding season on the Kolyma making detailed notes on the Ross's Gulls, and his field observations and description of the lonely Arctic setting where he made them are of a quality seldom attained by naturalists today.

Buturlin's eventual discovery of the Ross's Gull breeding grounds on the Kolyma

delta now raises the question of why it took so long to find the nesting place of such a conspicuously beautiful bird.

Breeding as they do on open tundra landscapes largely devoid of cover, and being very conspicuously coloured, Ross's Gulls have greatly adapted their behaviour to minimise attracting the attention of potential predators.

The breeding colonies are small – never more than twenty pairs, and the nests are more scattered than those of other gulls. The normal territorial aggression behaviour, pair bonding and incubation changeover ceremonials, all involving conspicuous ritual activity in the vicinity of the nest, are absent. During the incubation period, the birds meet at the nest for as little as two minutes in twenty-four hours to further minimise attention. As soon as the young hatch, they leave the nest to hide, and are brooded and fed much less often than the young of other gulls. At the end of two weeks they are fed only about four times a day.

After watching the nest of a Ross's Gull for many hours, a friend of mine commented 'I have found that if you do not watch a nest continuously, and see the actual nest changeover, you would see nothing, and not realise the birds were nesting'.

Political change in Russia has until very recently prevented access from the West to the Soviet Union, and even now no Westerner has been able to retrace Buturlin's footsteps to the Kolyma. However, interest in Ross's Gull has not diminished and attention has been largely focussed on the bird's occurrences in Europe and, latterly, in the New World.

In his *Avifauna Svalbardensis* published in 1963, Herman Lovenskiold quotes only one authenticated record of Ross's Gull for mainland Spitzbergen, that of a single adult in breeding plumage seen by him flying over a colony of Arctic Terns, at Adventfjorden, in West Spitzbergen, on 1 July 1950. However, in February 1959 Lovenskiold received a letter from a Mr Knut Samuelsen who, in 1955 had been a radio operator at Cape Linné, in west Spitzbergen.

Extracts from Samuelsen's letter read as follows: 'One day, at the end of April 1955, the steward came running and told me that a flock of birds was passing the station. They had pink breasts and a black ring around the neck. At the end of May we were visited by a bird which I have never seen (before). It was perhaps a little larger than a tern but had a breast like the most wonderful sunset. It kept to the station for about ten days, and then made a nest ten metres from the south corner of the house. One egg was laid and it had the same protective colour as the eggs of terns. The bird itself had a rose-coloured underside and the sharply defined ring around the neck was not more then 3–4 mm broad. After some days, one of the men on the station shot the bird, which was then thrown away.'

The records of Ross's Gulls accumulated by Ross, Nansen, Andrée and others north of Spitzbergen and Franz Josef Land would seem to confirm the existence there of a summering area for immature and non-breeding adult birds. Some birds may remain there for the winter, perhaps joined by others from Siberia at the end of the breeding season. They are presumed to winter somewhere in the Arctic Ocean.

Additional evidence to support the Spitzbergen/Franz Josef Land summering theory was gathered during the scientific cruise of the Swedish icebreaker 'Ymer' north of and between Greenland, Spitzbergen and Franz Josef Land during July to September 1980. (The Ymer-80 Expedition). The expedition covered much of the area earlier found productive for Ross's Gulls by Ross and Parry in 1827 and, especially, by Andrée in 1897.

Between 3 July and 6 August, a minimum of 670 Ross's Gulls were seen north of Spitzbergen and Franz Josef Land. Of almost 500 aged individuals 12 per cent were second year birds. Between late August and mid-September more than a hundred more birds were found in the outer edge of the permanent pack ice between Spitzbergen and north Greenland. Working again north of Spitzbergen, between 10 and 19 September, a minimum of a further hundred birds were seen.

In western Alaska the bird is a casual visitor to St Lawrence Island in late autumn and late spring, but south of the Bering Straits it is rarely seen. In northern Alaska Ross's Gull continues to be a fairly common to common migrant, especially at Point Barrow, where the maximum count for one day was 4300 birds in September 1976.

As in Murdoch's time arrival and departure dates are greatly influenced by offshore pack ice movements, and vary by weeks from year to year. Charles D. Brower, a resident at Barrow for many years until his death there in 1945, usually saw Ross's Gulls in September and October. He recalled that on 26 September 1928, the birds were around in thousands, and many were shot and eaten by the Eskimos who, like Brower, considered them excellent eating, an opinion I can support after a similar experience of my own at Barrow in 1975.

More recently large numbers of Ross's Gulls were seen in the Chukchi Sea, to the west of Barrow, in the late autumn of 1970, thus substantiating the records of earlier sea and land-based observers there. However, despite the enormous numbers of birds sighted and killed at Barrow, little more is now known of the origin, destination and habits of the Ross's Gulls seen in Alaskan waters than was known in the days of Murdoch and Brower. It was against this fragmentary background of observations that I spent the late autumn of 1975 in the Point Barrow area, specifically to record there the movements of the Ross's Gulls that year.

Observations from land were made along the shoreline between Barrow Village and Point Barrow and Plover Point beyond it. Two shipboard series of observations were made from the U.S. Coastguard icebreaker *Burton Island*. The first was from 18 to 24 September when the ship operated up to 16 kilometres offshore between Barrow and Wainwright. The second was from 28 September to 7 October, when the ship cruised through partly frozen seas to Prudhoe Bay and back to Barrow, a voyage of two weeks.

The first Ross's Gull at Barrow, an adult in winter plumage, arrived on 6 August, almost six weeks earlier than expected. The last birds to be sighted were part of a large movement seen partly from the shore and partly at sea on 7 October. During this period a total of approximately 700 Ross's Gulls were seen, of which almost 80 per cent were adults.

Ross's Gulls frequently associated with Sabine's Gulls when feeding. The two species appear to have very similar life styles; both breed mainly in freshwater marshes and become insectivorous in summer; outside the breeding season they move to a saltwater environment on the coast and at sea, and feed on crustaceans and fish.

In addition to the earlier records we have already noted there are at least thirty records of Ross's Gull from west Greenland. All but two records have been of adult birds, usually in May, June or July. Four isolated cases of breeding are known in Greenland, and others have been suspected.

About 1880, an Eskimo hunter from the Christianshab district of Disko Bay, in west Greenland, sold the fresh carcase of a male Ross's Gull to a Mr Fencker, but no eggs were preserved. The Eskimo later admitted to having eaten them.

On 15 June 1885, again at Disko Bay, a pair were shot at a nest with two eggs situated within an Arctic Tern colony. The skin of the female bird was subsequently acquired by Henry Seebohm, the wealthy steelman, globe trotting ornithologist-explorer, and prolific author, from Sheffield in Yorkshire. The single egg that was taken went to the Natural History Museum in Copenhagen, where I saw it in 1974.

The third breeding also took place at Disko Bay. The nest, containing one egg was found on 14 June 1979. Twelve days after its discovery the nest was found to be empty, and the egg was presumed taken by local people collecting eggs for food, as they have done here for generations.

More surprisingly the most recent Greenland breeding has taken place on the barren sea shore of the High Arctic. On 15 July 1979, the same summer as the third Disko Bay breeding, two adult Ross's Gulls were found with a nest containing one unhatched, probably infertile egg, and one chick several days old, at Kap Eiler Rasmussen in Peary Land, north-east Greenland.

There are twenty-three accepted records of Ross's Gull for Iceland up to the end of 1984, possibly involving only fourteen individual birds, of which nine have been adults and five immatures. Birds have been seen in every month from February to August, most between May and July with a peak in June. The earliest record, of a single bird, is as recent as 1909, followed by another single in 1913. Between 1949 and 1971 there are five further records of single birds, and there were two in 1960.

An adult bird in summer plumage, thought to be the same individual, appeared in the Skipalón area of northern Iceland almost every summer between 1972 and 1980, and at nearby Akureyri in 1980 and 1981.

In 1977 I was able to trace only four records of Ross's Gull for the Faero Islands, none of them recent, and at least two in summer. I have been unable to trace any subsequent ones. The collections of the British Museum Natural History contain two specimens taken in the Faeroes, in 1864 and 1872.

In recent years, interest in Ross's Gull has centred very much on Canada, where summer records from the Arctic islands suggested that birds might be nesting somewhere in the Arctic archipelago.

In June 1976, three occupied nests were found on low, stony reefs on Cheyne Islands, east of Bathurst Island. Three pairs returned in 1977 although no breeding was proved, but six pairs nested in 1978. Since then birds have attempted to nest or have been seen in the vicinity every year until at least 1981. All the nests were predated, most of them by Arctic Foxes, but some chicks were killed by Arctic Terns which were nesting nearby.

Opportunistic nesting by isolated pairs or small groups of Ross's Gulls may be a more or less regular phenomenon in the western High Arctic.

A specimen from Keewatin, Ontario in June 1965, and a sight record there in June eight years later, together with one at Churchill, Manitoba, on the west shore of Hudson's Bay in 1978, suggested the possibility of breeding in low-Arctic Canada also.

This was confirmed when three pairs of Ross's Gulls nested in the summer of 1980 at Akudlik, Churchill, Manitoba, the first ever known to breed in mainland North America. In all cases, the nests appeared to be in habitat generally similar to that used by the birds on the Siberian tundras, and there were breeding colonies of Arctic Terns nearby, as there are in Siberia. A subsequent sighting of an immature bird on the Hudson's Bay shorelines nearby suggests that one bird may have been raised from the 1980 Churchill breedings.

In 1981 the birds came back and three nests were found. One nest with three eggs was robbed by a professional egg collector, who took not only the eggs but the nest and the hummock it was built on, cut away from the ground with a spade. Natural predators and inclement weather prevented successful breeding at the other two nests.

1982 was no more successful than the previous years. Eventually twelve Ross's Gulls arrived and four pairs were known to have bred. At least six chicks hatched, but five were killed in a heavy rainstorm and the sixth was taken by a mammal predator, probably a weasel. Four pairs nested in 1983, but eggs and young were taken by ravens, and again by mammalian predators. Only one young was successfully reared to the flying stage, the first published, provedly successful breeding outside Siberia.

One young was again successfully reared in 1984, when six adults returned to breed. In 1985 and 1986 up to five birds were seen in spring and summer at Churchill. No nests were actually found but breeding probably did take place.

Seven birds returned in 1987 and two pairs bred, but again no young were reared. At least one nest was probably robbed by Arctic Skuas.

The potential breeding area for the birds, the Hudson's Bay/James Bay lowlands, is vast – about four times the area of Britain and Ireland, and the birds are amazingly elusive when breeding. It seems likely that more nesting localities remain to be found.

Between 1966 and 1983 I can trace only three further sub-Arctic Canadian sight records, two adults, one of them in summer plumage, and a first-winter bird.

The first confirmed sighting in mainland United States was a winter plumaged adult bird first seen on 2 March 1975, which appeared with flocks of Bonaparte's Gulls on

the Merrimack River, Salisbury, Massachusetts. Its reception was unprecedented in the history of birdwatching. It was seen in the flesh by thousands, broadcast on Nationwide TV and featured on page one of *Time* magazine. The weekend following its confirmed discovery there were close to two thousand people daily, some arriving by jet from as far away as Texas and California.

A second, also winter-plumaged adult bird was first seen at Wilmette Harbour, south-west Lake Michigan, Illinois, on 19 November 1978.

The most astonishing record of Ross's Gull in the United States and probably in the world is that of a first-winter bird found at Jumbo reservoir near Julesbury, on the east Colorado Plains, almost a thousand miles from the nearest seawater. During its stay, from 28 April to 7 May 1983, it was nevertheless seen by at least a hundred observers.

A third, presumably wandering bird from the Churchill breeding grounds on Hudson's Bay, again in adult winter plumage, stayed for ten days from 4 April 1984 at the Agassiz National Wildfowl Refuge in Marshall County, Illinois.

I can trace one more confirmed U.S. record up to the end of 1984, that of an adult bird at West Haven, Connecticut, on the north shore of Long Island Sound, from 11 to 22 April 1984.

The sixty-first report of the Council of the Leeds Philosophical and Literary Society, read at the Annual General meeting on 3 May 1881, contains an appendix listing details of the rarer birds formerly in the collection of the late Sir William M. E. Milner, and subsequently in the possession of the Society.

By far the most interesting item in Milner's collection was a specimen of Ross's Gull (then called the Cuneate-Tailed Gull), which was killed near Tadcaster in Yorkshire. It was new to the European list, pre-dating all other records but those of Ross and Parry.

There is some confusion over the exact date, precise locality and collector, but, in pursuing his claim to an addition to the British avifauna in his letter to the *Field* magazine, in March 1847, only three months after the event (his only published reference to the record), Sir William would have been scrupulously careful to get his facts straight. I am therefore inclined to believe that the date of 22 December 1846 is the correct one, and it is to Thomas Robinson that we should attribute credit for the first European record of Ross's Gull. The specimen was an adult bird in winter plumage, the first known example of this plumage state.

The stretch of the River Wharfe where Milner's bird was obtained lies south-east of Tadcaster in what is now North Yorkshire. The land here is still prone to flooding in winter and early spring, continues to attract concentrations of wintering gulls, and looks today much as it must have done on the day the first European Ross's Gull found its way there in winter of 1846/47.

Milner's specimen of Ross's Gull passed into the ownership of Leeds Corporation when it took over the Philosophical Society's Museum, then in Park Row, in 1921, and would have been on display in the museum's main gallery during the war years. Almost all the specimens including, apparently, the Ross's Gull were destroyed when a German bomb fell on the museum in 1941.

An intriguing postscript to the Tadcaster affair occurred in 1976, when my attention was drawn to a mounted specimen of Ross's Gull then on display in Wakefield Museum, an adult bird in winter plumage. The specimen bore no label, no number or identification mark of any kind, and there was no record of it in any of the museum's registers.

There is evidence to suggest that the specimen had been in Wakefield's possession since at least the late 1940s, but where had it come from? I can find no reference to a specimen ever having been owned by Wakefield Museum, and the intriguing possibility must therefore exist that the specimen from Sir William Milner's collection was somehow transferred from Leeds to nearby Wakefield before the War, possibly as an unrecorded loan, and escaped the bombing.

Fortunately for observers in this country and the Continent Ross's Gull is being recognised in European waters with some regularity. David Bannerman, in 1962, lists the following accepted occurrences of Ross's Gull in Europe (excluding Spitzbergen,

Iceland and the Faeroes): Heligoland 1858, Sardinia 1906, Norway 1909 and 1949, France 1913, Germany 1953 and another since, Denmark 1955, Holland 1958 and Britain 1846/47, 1936 and 1960.

Since then another record had come to light for Heligoland, another three for Norway, one more for Holland and no less than a further 45 for Britain and Ireland. Finland recorded its first Ross's Gull in 1973 with another in 1982, Sweden had one in each of the years 1981–84, and Belgium's first bird was at the Channel port of Niewpoort in April 1983. (These records are those confirmed by the Rarities Committees of the countries concerned up to the end of 1985.)

The main concentration of records in this country has been in Shetland and on the north-east coast of England. Between them these two areas account for well over 50 per cent of the total British and Irish records. This pattern of distribution clearly indicates an arrival into British waters from the north-east, supporting the theory of a wintering population in the Spitzbergen area with a south-west drift of birds from there.

The distribution of British and Irish occurrences of Ross's Gulls with respect to the month of first sighting reveals a build-up of records from late October to a peak in January. A second, smaller peak in April and May presumably marks the northward return of birds to breeding, or in the case of non-breeding birds, to summering areas, one of which is now known to be in Spitzbergen waters.

The recent pattern of British and Irish records suggests that individual Ross's Gulls probably summer and/or winter in the North Sea at times, some possibly for several years, appearing in sometimes widely scattered localities during their stay.

As one would expect from its geographical position Yorkshire has fared well with Ross's Gulls. Since the occurrence of the first European record at Tadcaster there have been a further five accepted records, more than any other county in Britain except Shetland.

Whilst walking along the south beach at Bridlington on 17 February 1962, Brent Richards, then only a schoolboy, saw an unfamiliar gull which he later reported as an adult Ross's Gull in winter plumage. Brent Richard's original description of the bird was written with a thoroughness, confidence and maturity which belied his tender years, in an age when young people were not supposed to see, let alone find birds as rare as a fourth British record.

During the next six days the bird was seen with other gulls at or near the sewage outflow on the south beach by a documented total of only eight people, and was last reported early in the morning of 22 February.

The third Yorkshire record was a bird found by my wife and I, again at Bridlington, in the afternoon of Sunday 27 January 1974, as it sat on its own on the sea off the north pier. It was a sub-adult bird in immediate post-first-winter plumage, and could conceivably have been the long-stay individual which later appeared at Christchurch in Hampshire, from 16 June to 20 August, having by then acquired a black collar round its neck.

The next Yorkshire Ross's Gull was first seen by R. H. Appleby at Scalby Mills near Scarborough in the early afternoon of 27 March 1976. On its first visit to Scalby it stayed for four days. What was presumably the same bird reappeared there on 22 April and remained until the 28 April. During its absence what was thought to be the same individual occurred at South Shields on the Tyne, 65 miles north of Scarborough, from 9 to 11 April. The Scalby/South Shields bird was one of five Ross's Gulls seen in Britain and Ireland that year.

The two most recent occurrences have both been at Filey Brigg. An adult winter-plumaged bird was found there by Mr and Mrs H. J. Whitehead in the afternoon of 7 December 1980, where it remained until last seen flying away to the north late the following morning.

The second Filey bird, again a winter adult was seen on the Brigg briefly, but adequately by Rosemary Bowman, in the afternoon of 17 February 1983. It was re-found there the following day (Plate 3) and, after appearing before at least several hundred birdwatchers, was finally seen at dusk on 20 February.

In recent years a great deal of work has been carried out on the breeding biology of the Ross's Gull in Siberia.

In 1975 an estimate of the population of Ross's Gulls in the area between the Kolyma and Indigirka rivers was put at no more than 5,000 individuals. Reports from the Yana river delta are less numerous and systematic, but at least one large colony of about fifty pairs is known to breed regularly there (Plate 4).

On 2 July 1973, scientists exploring the lower reaches of the Bolyshaya Balakhnaya river in the east Taimyr Peninsula found Ross's Gulls breeding about 30 kilometres from

PLATE 3

Adult, winter plumaged Ross's Gull in flight, taken by Peter Dunn at Filey Brigg, Yorkshire, 18 February 1983. During its four day stay it was seen by several hundred birdwatchers from many parts of Britain. The bird's generally graceful proportions and tern-like appearance are clearly apparent, particularly the long wings with white trailing edges, and the delicate bill. The black mark behind the eye is replaced in summer by a black collar, and the pointed, triangular-shaped tail is diagnostic at all seasons.

the river mouth. Although about 40–50 pairs of birds were present, only five nests could be found. Other species breeding in the area included Sabine's Gull, a rare bird in that locality.

More recent reports from the Taimyr region would seem to suggest that larger numbers of Ross's Gulls than this breed there on a regular basis.

In 1978 and 1979, detailed observations were made of a colony of breeding Ross's Gulls in the lower reaches of the Kolyma river in the same area where Buturlin made his original studies. In all, data were obtained from 52 nests.

During the first days after arrival back in the Kolyma valley the gulls were usually found on the deep, ice-covered lakes near the river. In early June they began to claim their nesting territories, which are occupied for no more than two months each year, and the young are there for little more than four weeks.

In 1905, Buturlin had noted the gulls' predilection for breeding on mossy hummocks and small islets, and in 1978/9 the earliest egg layings occurred here. However, most of the birds built on the lake shores and on the strips of drier ground. The nest itself is a small depression lined with dry sedges and sometimes lichens (Reindeer moss).

In 1978 the main egg laying period started on 5 June and all clutches were completed within a period of eleven days. The maximum clutch size is three eggs, and the largest clutches are the first to be laid. The earliest laying pairs, which produce the largest

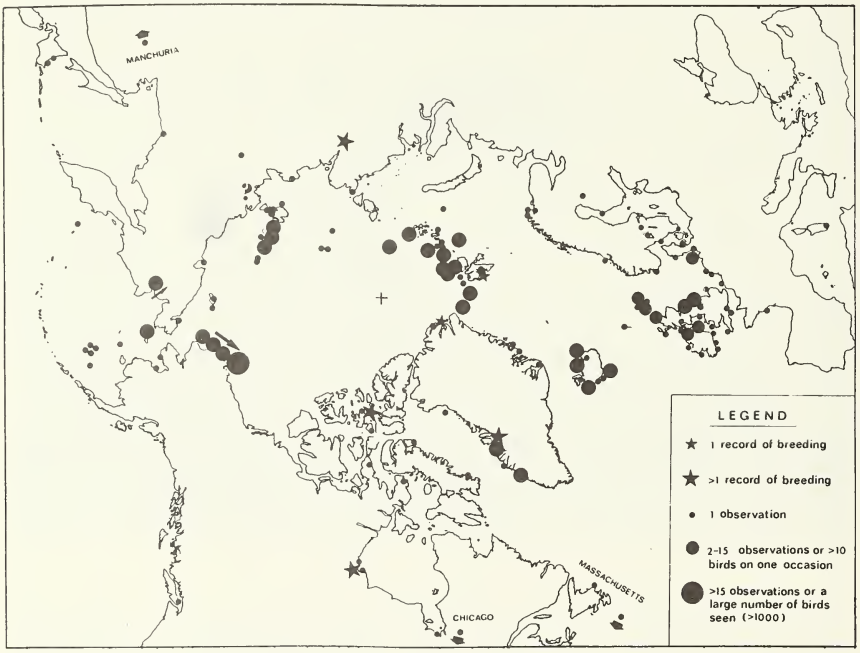


PLATE 4

Map showing world distribution of Ross's Gull including known, confirmed records up to the end of 1985. The Siberian breeding grounds are shaded, and isolated breeding records elsewhere are marked with a star. Note the concentratation of records in the Spitzbergen-Frans Josef region, a known summering area for immature birds and non-breeding adults, and where many birds probably occur in winter. The relative abundance of records for the North Sea, especially Britain, suggest the probability of the same individual birds occurring, often repeatedly, at widely scattered localities, summering and/or wintering, possibly over several years. (Chart modified from an original published by Blomqvist and Elander (1981) and reproduced here by kind permission of Sven Blomqvist.)

clutches, are usually the brightest pink in colour, and it is thought that these are the older birds.

At the time of laying the egg weighs about 22 grammes, and in favourable weather conditions the incubation period is usually 19–20 days, but in cold weather can be up to 28 days. The newly emerged chicks weigh about 15 grammes, and after three days they move about freely within the colony, tending to concentrate in areas rich in aquatic invertebrates. They begin to fly by about the sixteenth or seventeenth day, and at this stage form discrete flocks within the colony, lingering about for about two weeks or so before moving away to the north.

Egg loss and chick mortality is very high, due mainly to adverse weather conditions, but also partly due to predation. In 1978, in the main colony, of 60 eggs laid only 22 young reached the flying stage, a mortality rate of 63 per cent. In 1979, a less favourable year in climatic terms, the laying period was extended to over three weeks, only 13 out of the 20–25 pairs in the main colony even attempted to breed, and only 7 out of 29 young that hatched flew.

In Yakutia, the central breeding area for the Ross's Gull, the bird has enjoyed the theoretical protection of the law since 1949.

The main threat to the birds is now from increasing settlement by western man, resulting in more and more disturbance and accelerating habitat loss through development and pollution. Additionally, the increase of Russian tourists into the area has resulted in numbers of Ross's Gulls being illegally killed, and their skins sold to visitors as souvenirs.

In winter the most extensive of the many ice-free zones on the Chukchi coast, in north-east Siberia, extends for two hundred miles from Krest Bay to Providence Bay.

The local natives claim that large numbers of Ross's Gulls are seen there in March, numbering 'not less than 100,000 birds'. Even allowing for a gross over-estimate of numbers (the Russians estimate the total population of their sexually mature birds at 10,000 individuals), the indications are that here might lie one of the long sought-for wintering grounds of the Ross's Gull, in addition to that already suggested in Spitzbergen waters.

Straggling Ross's Gulls, possibly from here, have wandered south as far as Japan. A flock of four adults and three immature Ross's Gulls was seen at Shari Harbour in northern Hokkaido on 14 January 1974, the first record for Japan, and there has been at least one further sighting in Hokkaido since.

The village of Wadworth lies four miles south of Doncaster, in south Yorkshire, on the old coach road to Loversall and Worksop. By one of those uncanny happenings of Fate, Wadworth is the next village to the one I have lived in for the past twelve years. One hundred and fifty years ago Wadworth was a small, rather isolated community of about 700 inhabitants, half its population today.

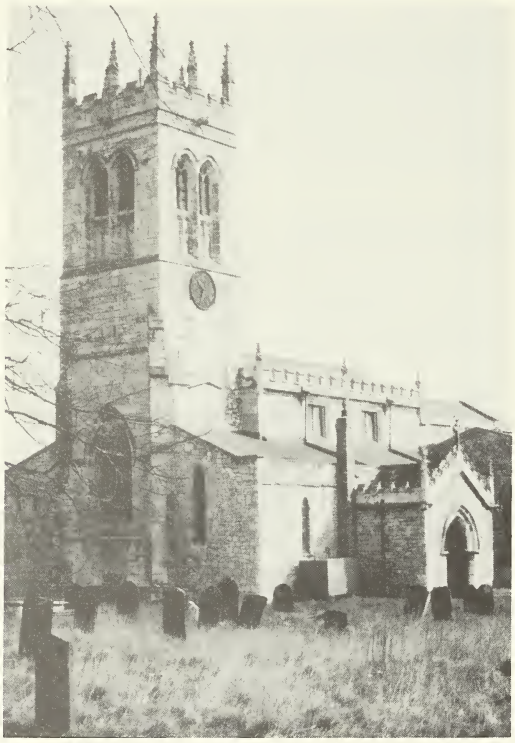
The main house of the village was and still is Wadworth Hall, an important Georgian small mansion designed by James Paine, and built in 1749 for the Wordsworth family. In 1843 the Hall was occupied by the family of Thomas Coulman, whose occupation was described as that of 'Gentleman'.

18 October 1843 was a day of special significance, Thomas Coulman's eldest daughter, Anne, was being married in Wadworth's fine, originally Norman church, then called St Mary's (Plate 5). The certificate which records the marriage described the bridegroom as a bachelor of Hanover Square, London, and a Captain in Her Majesty's Royal Navy. He was forty-three years of age, and his name was James Clark Ross.

Eight witnesses signed the marriage certificate one of whom was Captain Francis Rawdon Moira Crozier, who must undoubtedly have been Best Man. Crozier was Ross's closest friend, and a companion on almost every voyage since they had first met on Parry's second attempt at the North–West Passage in 1821, during which Ross discovered the gull that was subsequently named after him.

After his marriage and the conferring of his Knighthood, Sir James Clark Ross retired with his wife to a very quiet life in the village of Aston Abbotts, near Aylesbury, always being consulted on Arctic matters but taking no further part. He had promised his wife's father he would not undertake any further voyages of discovery.

Only one event was to disturb Ross's retirement. Encouraged by Sir John Barrow, who was still obsessed with the trans-navigation of the North–West Passage, Sir John Franklin mounted an expedition to the Canadian Arctic in May 1845. Three years later,



Photograph by the author

PLATE 5

The 13th-century Parish Church of St John Baptist (formerly St Mary's), in the village of Wadworth, near Doncaster, South Yorkshire. Scene of the marriage of James Clark Ross to Anne Coulman, of nearby Wadworth Hall, on 18 October, 1843. Captain Francis Rawdon Moira Crozier, Ross's closest friend was almost certainly Best Man at the wedding, and was lost in the Canadian arctic with the Franklin expedition two years later.

after no news of the expedition had reached England, Lady Franklin appealed to Lady Ross to allow Sir James to return to the Arctic to search for her husband.

The expedition was unsuccessful and returned to the Yorkshire fishing town of Scarborough on 4 November the following year, Ross's final maritime link with the county. The ships of Franklin's expedition were last seen moored to an iceberg in Baffin Bay on 26 July 1845. No member of the expedition was ever seen again and with them were lost two vessels Ross had at one time commanded, and his best friend Francis Crozier.

The death of Lady Ross in 1857 after only fourteen years of marriage was a shock to Sir James from which he never recovered and he died on 3 April 1862, at the age of sixty-two. He was buried beside his wife in the churchyard at Aston Abbotts. In the church, above the altar, a stained glass window bears the inscription 'To the glory of God, and in memory of Rear-Admiral Sir James Clark Ross and of Anne, his wife'.

AUTHOR'S FOOTNOTE

My interest in Ross's Gull and in the exploits and achievements of the individuals who contributed to the fascinating history of its discovery and our present understanding of its status, notably Sir James Clark Ross, has become a personal odyssey extending over a period of more than thirty years.

Since Ross's Gull was first seen much has been written about it and its researchers, in English and other languages, almost all of the former I must now have seen in the original and much of the latter in translation. To quote all of these sources would occupy a great deal more space than is at my disposal.

My three major papers on the subject, published in 1977 and 1979, contain references to all the major works available to me up to that time, and may be found by perusal of them. I have quoted from all of them in my Review and am grateful to the Editors of the journals in which they appeared for permission to do so. They are:

Densley, M. (1977) Ross's Gulls in Britain. *Scottish Birds,* **9:** 334–342.

Densley, M. (1977) The Ross's Gull *(Rhodostethia rosea)* in Arctic Alaska *Polar Record,* 603–605.

Densley, M. (1979) Ross's Gulls in Alaska. *British Birds* **72:** 23–28.

To the reference sources quoted in the above works I would add the following:

Adams-Ray, E. (1931) The Andrée Diaries, Bodley Head, London. (First English Edition).

De Long, E., ed. (1883) *Voyage of the 'Jeannette'* (2 vols.) Kegan Paul, London.

Dodge, Ernest S. (1973) *The Polar Rosses.* Faber and Faber, London.

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Williams, H. L. (1882) *The History of the Voyage and Shipwreck of the U.S.S. Steamer 'Jeannette' in the Polar Seas.* A. T. B. De Witt, New York.

Interest in Ross's Gull has, if anything, increased since my major works were published, and a wealth of new material has since appeared including accounts of new work carried out on the breeding grounds in Siberia and first breedings in the New World, again too numerous to quote in full. Of these, the major sources, which also contain references to most of the others, are as follows:

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Many people have provided me with assistance with my study in many different ways, some of whom have already been acknowledged in earlier works. To those I would add the following (with apologies for omissions):
Geoffrey Acklam, Lars Norgaard Andersen, A. V. Andreev, Sven Blomqvist, George Divoky, Philippe Dubois, Peter Dunn, Daniel D. Gibson, Peter Grant, Finnur Gudmundsson, Martti Hario, Stewart Holohan, Christian Hjort, R. F. Koes, Herman Lovenskiold, Ian Lyster, G. F. Mees, Gunnlauger Petursson, Finn Salomonsen, H. E. Wolters.

BOOK REVIEW

Animal Physiology: Mechanisms and Adaptations by Roger Eckert, with chapters 13 and 14 by David Randall and revisions by Georg Augustine. Pp. 683, with numerous figures and illustrations. W. H. Freeman and Company, New York. 1988. £35.95 hardback, £19.95 paperback. (International Student Edition).

This third edition of R. Eckert's book still serves as one of the best in the subject of Animal Physiology for undergraduate and graduate students at the university level. It contains a considerable amount of information assembled in an organised and simple manner. The book includes sixteen chapters of basic and essential materials, with many examples that cover most of the different group of animals, including humans.

Chapters 1 and 2 provide a general introduction to the subject, while relating it to essential principles in other subjects; chapters 3 and 4 focus on cell energetics and intercellular regulations; chapters 5 to 8 are devoted to the nervous systems and other related mechanisms; chapter 9 describes the endocrine systems with special reference, in this edition, to the recent advances in intercellular signalling mechanisms; chapters 10 and 11 cover muscle contractility and cell motility; and chapters 12 to 16 focus on systems responsible for homeostasis and internal environment.

The massive use of figures, tables and illustrations, as well as parenthetical boxes, glossary and indices, helps greatly in providing a complete understanding of the ideas and principles being explained. This book is well produced, providing the reader with a wealth of information on the subject of animal physiology, and I recommend it as an up to date account to the subject.

AHE-S

RECOLONIZATION OF BURNT AND CUT HEATHLAND IN THE NORTH YORK MOORS BY ARACHNIDS

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Introduction

Although the spider fauna of lowland heaths in Britain is reasonably well known (see Webb (1986) for the Dorset heaths or Smith (1982) for the Vale of York heaths), the fauna of upland heaths is relatively poorly studied. Ratcliffe (1977) indicated that 61 species of spiders could be considered to be montane, submontane or 'northern' in their British distribution. Coulson and Butterfield (1986) have also described the spiders associated with increasing altitude in northern England, indicating that individuals in the family Linyphiidae form the majority of the spider fauna at high altitudes.

Heathland has traditionally been managed by periodic burning so as to destroy accumulated fuel and stimulate regeneration of the dominant plant, *Calluna vulgaris,* either by growth of dormant buds near the stem base or by germination of seeds in the soil seed bank. The aim of such management is to provide browse for herbivorous animals, especially sheep, red deer or grouse. Cutting has recently been introduced as an alternative method of management, largely due to fire risk to adjacent forest plantations but also due to less frequent burning having led to larger fuel loads on the heathlands and the consequent risk of fire being more intense, more prolonged and igniting the litter or humus layers of the soil. Although the effects of these management practices on the spider communities of upland heaths are largely unknown (Usher and Gardner, 1988), the succession of spiders on Dorset heaths following fire has been described (Merrettt, 1976) and is probably related both to changes in the vegetation structure and to changes in microclimate (Webb, 1986).

The aim of this paper is to investigate the colonization of burnt and cut upland heath by arachnids. There are two specific questions to be answered. First, are all species of arachnids moving through the burnt heathland, or is there a distinct community of arachnids occurring on burnt parts of the heathland? Second, are there differences in the effects of burning and cutting on the arachnid community? The first of these questions relates to the possible identification of early and late stages of succession; the second question is important if the traditional method of management (burning) is to be replaced, at least partially, with a new method of management (cutting) in areas of conservation importance.

Field Location and Methods

The study was located on Danby Low Moor (national grid reference NZ 727104), an area of heathland at an altitude of 260m in the northern part of the North York Moors National Park. The dominant vegetation is *Calluna vulgaris* (c. 99 per cent ground cover), with *Erica cinerea* (c. 18 per cent ground cover, often beneath the *Calluna*) and 7 other species *(Agrostis capillaris, Carex pilulifera, Deschampsia flexuosa, Empetrum nigrum, Eriophorum angustifolium, Festuca ovina* and *Juncus squarrosus)* all with less than 1 per cent ground cover. Mosses are frequent under the heather canopy, with *Pohlia nutans, Hypnum jutlandicum, Campylopus introflexus* and *Dicranum scoparium* being the most abundant. Leafy liverworts (4 species) were sparse and lichens *(Cladonia* spp.) were abundant.

An older age-class of heather, c. 20–25 years after burning, was selected for study. In April 1987 strips of 30–35 m width were burnt. Three transects of pitfall traps, running from unburnt heather on one side of a burnt strip to unburnt heather on the other side, were inserted in mid-July 1987. One of these transects is shown diagramatically in Fig. 1a. On the same day that the burning was carried out, strips of similarly aged heather were cut; because these strips were only about 14–15m wide the transects across

the cut area each contained fewer pitfall traps (see Fig. 1b). The cut heather was mechanically raked off the cut zone, though both the cutting and raking operations left some *Calluna* debris on the ground surface.

Despite the known difficulties of interpreting the pitfall trap data (Southwood 1978), such traps are an appropriate method of sampling the arachnid community of upland heaths. Trap data relate to both abundance and activity of the arthropods, both features being important in the colonization of newly burnt or cut habitats. Also, as many of the studies on lowland heaths have relied on pitfall trap data, use of similar trapping methods allows for comparison of the results. Trapping was carried out over a continuous 5-week period, from 14 July to 18 August 1987 inclusive. The traps were emptied each

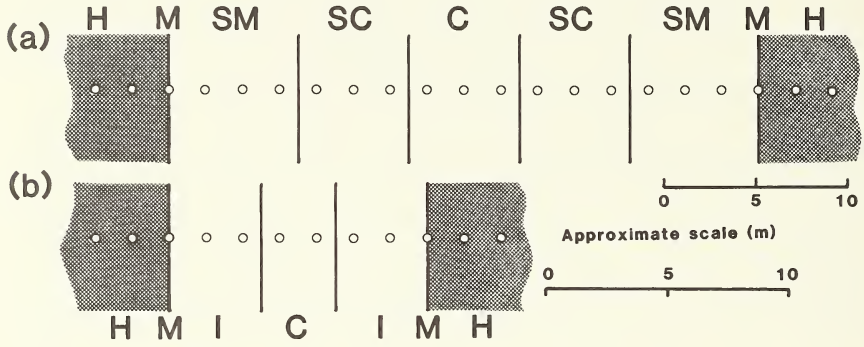

FIGURE 1

A schematic representation of the transects of pitfall traps. The circles indicate locations of pitfall traps, and vertical lines denote the zones used in the subsequent analyses. (a) The transects through burnt heathland contained 21 or 22 pitfall traps. Zones are defined as unburnt (H; shown shaded), margin (M; on the margin between the burnt and unburnt heather), submargin (SM), subcentral (SC) and central (C; in one transect this contained 4 traps). (b) The transects through the cut heathland contained 12 pitfall traps. Zones are defined as uncut (H; shown shaded), margin (M), intermediate (I) and central (C).

week, when the preservative (ethylene glycol, blue anti-freeze) was renewed. The arthropods in the traps were sorted into groups in the laboratory, and the arachnids were identified to species level. For analysis, various zones across burnt or cut areas have been recognised, as shown in Fig. 1. The uncut or unburnt zones were clearly demarcated, as were the marginal zones where the pitfall trap was placed exactly on the margin between cut and uncut, or burnt and unburnt, heather. Within the areas that had been cut or burnt, the zones were defined as of equal width, 2 traps (c. 3m) wide for the 'cut' transects and 3 traps (c. 6m) wide for the 'burnt' transects.

Results

A total of 50 species of spiders, 2 species of harvestmen and 1 species of false scorpion was collected (see Table 1). The total catch of arachnids was 4889 individuals, being composed of 3863 harvestmen, 1009 spiders and 17 false scorpions. A few pitfall traps were damaged, probably by sheep that freely grazed the study area. Thus, the counts in Table 1 are based on 317 trap weeks on the three transects running across burnt heathland and on 180 trap weeks on the cut heathland (missing data posed difficulties in subsequent mixed-model analyses of variance, in which zones were treated as fixed effects, weeks as random effects; the *F*-value for the zones/weeks interaction was never significant).

Species	No. of transects		Species	No. of transects	
	Burnt	Cut		Burnt	Cut
Spiders					
Alopecosa pulverulenta (Clerck)	0	1	*Micaria pulicaria* (Sundevall)	0	3
A. accentuata (Latreille)	1	0	*Micrargus herbigradus* (Blackwall)	17	8
Araeoncus crassiceps (Westring)	2	0	*Oedothorax fuscus* (Blackwall)	0	2
Araneus quadratus Clerck	1	0	*Pachygnatha degeeri* (Sundevall)	0	1
Bathyphantes parvulus (Westring)	1	0	*Pardosa palustris* (L.)	31	5
B. nigrinus (Westring)	1	0	*Pelecopsis mengei* (Simon)	19	32
Centromerita concinna (Thorell)	2	1	*Peponocranium ludicrum*		
Centromerus dilutus (O.P.-Camb.)	2	2	(O.P.-Camb.)	1	1
Ceratinella brevipes (Westring)	0	2	*Pocadicnemis juncea*		
C. brevis (Wider)	9	14	(Lock. & Mill.)	1	0
Cheiracanthium virescens			*Porrhomma pygmaeum*		
(Sundevall)	1	0	(Blackwall)	1	0
Diplocephalus permixtus			*Robertus lividus* (Blackwall)	0	2
(O.P.-Camb.)	11	0	*Saaristoa abnormis* (Blackwall)	2	3
D. latifrons (O.P.-Camb.)	1	0	*Salticus cingulatus* (Panzer)	0	1
Drassodes cupreus (Blackwall)	3	0	*Scotinotylus evansi* (O.P.-Camb.)	1	0
Erigone atra (Blackwall)	27	12	*Tapinocyba praecox* (O.P.-Camb.)	9	2
E. dentipalpis (Wider)	1	0	*Thoenoe minutissima*		
Euophrys aequipes (O.P.-Camb.)	1	0	(O.P.-Camb.)	3	1
Gnaphosa leporina (L. Koch)	220	72	Thomisidae juveniles	16	6
Gnaphosidae juveniles	3	1	*Tiso vagans* (Blackwall)	1	0
Gonatium rubens (Blackwall)	4	1	*Walckenaeria acuminata*		
Haplodrassus signifer (C. L. Koch)	6	4	(Blackwall)	19	15
Hypselistes jacksoni (O.P.-Camb.)	0	1	*W. antica* (Wider)	2	1
Lepthyphantes cristatus (Menge)	4	2	*W. monoceros* (Wider)	11	0
L. ericaeus (Blackwall)	14	3	*W. nudipalpis* (Wider)	3	4
L. mengei Kulczynski	7	1	*W. unicornis* (O.P.-Camb.)	4	1
L. tenuis Blackwall	10	3	*Xysticus sabulosus* (Hahn)	21	9
L. zimmermanni Bertkau	3	6			
Linyphiidae juveniles	122	38	Harvestmen		
Lycosidae juveniles	65	39	*Mitopus morio* (Fabricius)	2321	1538
Meioneta gulosa (C. L. Koch)	11	0	*Nemastoma bimaculatum*		
M. rurestris (C. L. Koch)	12	2	(Fabricius)	4	0
			False scorpions		
			Neobisium muscorum (Leach)	13	4

TABLE 1

A list of the 4889 arachnids collected in the pitfall traps on the North York Moors. Nomenclature follows Locket *et al.* (1974) with later revisions of the British Arachnological Society's check lists for the spiders, Sankey and Savory (1974) for harvestmen and Evans and Browning (1954) for the false scorpion.

Abundance and diversity on the 'burnt' transects

Only one of the 42 species of spiders, *G. leporina*, was sufficiently abundant for the counts to be analysed by analysis of variance. Although there was significant week to week variability ($F_{[4,272]} = 3.36$, $P < 0.01$), there were also significant differences between the zones ($F_{[8,304]} = 3.30$, $P < 0.001$). The means, with confidence limits, are shown in Fig. 2a; there were significantly more *G. leporina* in the traps set along the margin between the burnt and unburnt areas and in the sub-marginal zone than in either the heather or the sub-central and central zones. Family Linyphiidae (Fig. 2a) also had

significantly more spiders trapped along the margin than in any of the other zones (t = 2.87 and 3.21 for comparisons between the margin and heather and the margin and sub-marginal zones respectively; both t values with 272 df).

Other distributional patterns can be seen in some of the other more abundant species, notably *W. acuminata* and *P. mengei;* both of these species were abundant in the heather and marginal traps, and virtually absent from all traps in the burnt area (Fig. 2b). *P. palustris* was not trapped in the heather, but was most abundant in the marginal and sub-marginal zones (Fig. 2b). *Xysticus* (probably only *X. sabulosus)* (Fig. 2b), *M. rurestris, D. permixtus* and *E. atra* (Fig. 2c) are all either infrequent or absent in the heather and marginal zones and appear to increase towards the central zone. *Micrargus herbigradus* is one of the few species that was more or less equally abundant in all of the zones (Fig. 2c).

The harvestman, *M. morio,* was the most abundant arachnid in the pitfall traps. Its distribution (Fig. 2d) shows the large difference between the traps in the unburnt heather and on the margin (arithmetic mean of 17.2 *M. morio* per trap per week in these zones) compared with the traps located in any of the zones of the burnt moorland (arithmetic

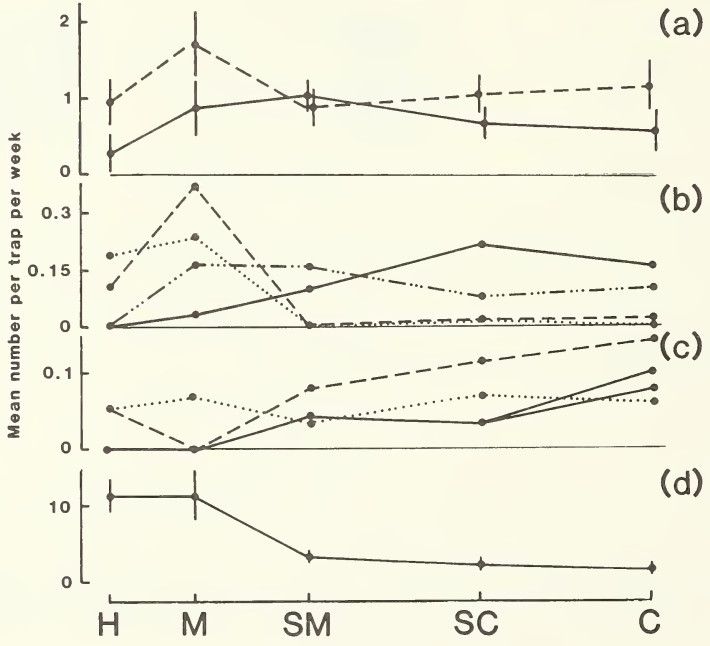

FIGURE 2

Distribution of spiders and harvestmen in relation to the zones of burnt heathland shown in Fig. 1a. (a) *Gnaphosa leporina* (continuous line) and Linyphiidae (dashed line), with 95% confidence limits derived from analyses of variance. (b) *Xysticus,* probably all *X. sabulosus* (continuous line), *Pardosa palustris* (dots and dashes), *Walckenaeria acuminata* (dashes) and *Pelecopsis mengei* (dots). (c) *Meioneta rurestris* and *Diplocephalus permixtus* (continuous lines; *M. rurestris* being more abundant than *D, permixtus* in the central zone), *Micrargus herbigradus* (dots) and *Erigone atra* (dashes). Arithmetic means are plotted in (a)-(c). (d) *Mitopus morio,* showing geometrical means and 95% confidence limits derived from an analysis of variance of logarithmically transformed counts.

mean of 3.5 *M. morio* per trap per week for the sub-marginal, sub-central and central zones). An analysis of variance of logarithmically transformed counts indicated that there were significant differences between the zones ($F_{[8,304]} = 27.00$, $P \ll 0.001$), as well as significant week to week variation ($F_{[4,272]} = 21.85$, $P \ll 0.001$).

Two measures of the diversity of the spider fauna of the 'burnt' transect are shown in Fig. 3a. The species richness varies between 17 and 26 species. Simpson's diversity index, *D*, which incorporates both the species richness and the relative abundances of the species, is smallest in the unburnt heather and margin, indicating that the spider fauna is most diverse in these two zones.

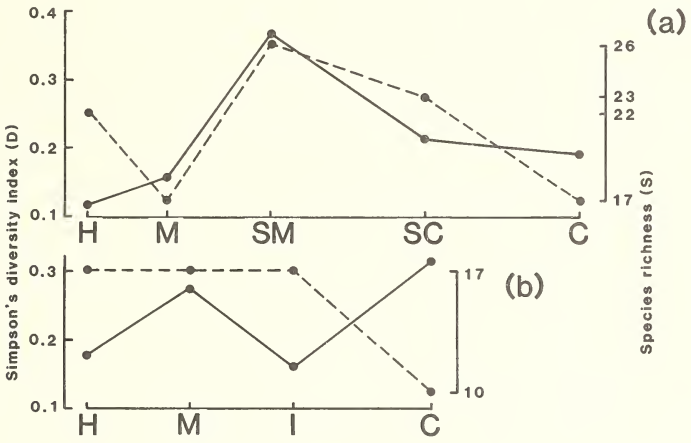

FIGURE 3

The species richness (S; dashed line) and Simpson's diversity index (D; continuous line) for the spiders in each of the zones shown in Fig. 1. Juvenile spiders, which could only be identified to the family level, have been omitted from the calculation of *D* and *S*. (a) The transects through burnt heathland, and (b) the transects through cut heathland.

Abundance and diversity on the 'cut' transects

Only one of the 33 species of spiders, *G. leporina*, was sufficiently abundant for statistical analysis. Although the week to week variation was not significant ($F_{[4,145]} = 0.80$), there were significant differences between the zones ($F_{[6,169]} = 10.10$, $P < 0.001$). The means, shown in Fig. 4a, indicate that the majority of *G. leporina* were trapped on the margin. The Linyphiidae (pooling all species of adults and unidentified juveniles) showed significant variation between both weeks ($F_{[4,145]} = 6.24$, $P < 0.001$) and zones ($F_{[6,169]} = 3.20$, $0.01 > P > 0.001$). More linyphiid spiders were trapped in the uncut and marginal zones (mean of 1.14 per trap per week) than in the intermediate and central zones (mean of 0.63 per trap per week) (see Fig. 4a).

P. mengei (Fig. 4c), *W. acuminata* (Fig. 4c) and *Lepthyphantes* (all 5 species) (Fig. 4b) show a distribution that is predominantly confined to the heather and marginal zones. *P. palustris*, although rather infrequent, was trapped only in the marginal and intermediate zones. Two species showed a marked preference for the intermediate and central zones; these were *E. atra* (Fig. 4c) and *X. sabulosus* (Fig. 4b). *C. brevis* (Fig. 4b) occurred throughout the zones.

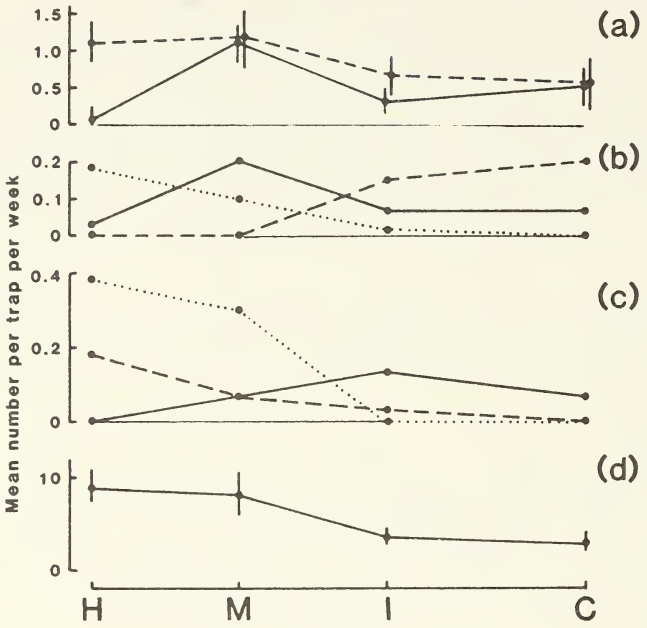

FIGURE 4

Distribution of spiders and harvestmen in relation to the zones of cut heathland shown in Fig. 1b. (a) *Gnaphosa leporina* (continuous line) and Linyphiidae (dashed line), with 95% confidence limits derived from analysis of variance. (b) *Ceratinella brevis* (continuous line), *Lepthyphantes* spp. (dots) and *Xysticus sabulosus* (dashes). (c) *Erigone atra* (continuous line), *Pelecopsis mengei* (dots) and *Walckenaeria acuminata* (dashes). Arithmetic means are plotted in (a)-(c). (d) *Mitopus morio,* showing geometrical means and 95% confidence limits derived from an analysis of variance of logarithmically transformed counts.

M. morio was again the most abundant arachnid in the pitfall traps. In the uncut and marginal zones, there was an arithmetic mean of 12.5 *M. morio* per trap per week, whereas in the intermediate and central zones the arithmetic mean catch was only 4.6 individuals per trap per week. An analysis of variance of logarithmically transformed data (Fig. 4d) indicated significant differences both between weeks ($F_{[4,145]} = 13.50$, $P < 0.001$) and zones ($F_{[6,169]} = 9.85$, $P < 0.001$).

Data for the diversity of the spider community in each of the four zones are shown in Fig. 3b. The species richness remained similar (17 species) in three of the zones, but was reduced in the central zone. Simpson's diversity index indicated that the most diverse zones were the uncut heather and intermediate, whilst the central zone was least diverse.

Discussion

Heathland that has been burnt looks superficially a poor habitat for arthropods. However, the data in Fig. 2 indicate that relatively large numbers of arachnids, both day-active like *Mitopus* and night-active like *G. leporina,* can be trapped in these burnt areas. Cut areas appear superficially to be less hostile habitats, largely because there is a greater depth of litter. The data in Fig. 4 indicate that arachnids are also active in these cut

areas. However, the abundance and behaviour of arthropods on the cut and burnt areas should be compared.

Merrett (1976) clearly demonstrated that some spider species on lowland heaths could be considered to be early successional after fire, whilst others could be considered to be later successional. Although the species composition of the upland heathlands of northern England is different from that of the lowland heathlands of southern England, this study indicates that some species are more abundantly trapped in newly burnt or cut areas. *X. sabulosus* was not found in any pitfall located in unburnt or uncut heather, it was rare in traps set on the margins, and its abundance increased towards the centre of both the burnt (Fig. 2b) and cut (Fig. 4b) areas. Several species of Linyphiidae also increased in abundance in traps located towards the centre of the burnt and cut zones; the commonest was *E. atra* (Figs. 2c and 4c), but others included *M. rurestris* and *D. permixtus*. Other species of Linyphiidae were more abundantly trapped in the heather and were either rare or absent on the burnt or cut heathland; examples are *W. acuminata* and *P. mengei* (Figs. 2b and 4c). The harvestman, *M. morio,* was similar, though it occurred at low density in the central zones of both burnt and cut areas (Figs. 2d and 4d). The predominantly hunting species of spiders, such as *G. leporina* and *P. palustris* were most abundant in traps located on or near the margin between the heather and either the burnt or cut heathland.

Although the species appear to behave similarly on the burnt and cut areas, there appear to be differences in spider abundance. In the uncut and unburnt heather the rates of trappings were virtually identical (1.25 and 1.21 spiders per trap per week respectively). Similarly the margins with the cut and burnt areas yielded virtually identical rates (2.87 and 2.93 spiders per trap per week). However, with distance from the margin the rate fell off more quickly in the cut area than in the burnt area; rates are 1.63 and 1.43 spiders per trap per week for the intermediate and central zones (see Fig. 1b) of the cut area, and 2.63, 2.36 and 2.02 spiders per trap per week for the sub-marginal, sub-central and central zones (see Fig. 1a) of the burnt area. The difference is greater than it appears since the zones of the cut area are only approximately 3m wide, whilst those of the burnt area are approximately 6m wide. The reasons for the apparent abundances being less in the cut area are unknown; it may be a genuine reduction or it may relate to a difference of spider behaviour with the marginally greater litter depth of the cut areas (most litter on the burnt area either having been burnt or blown away by wind).

The spiders of several habitats of the North York Moors have been listed by Coulson *et al.* (1984). In comparison with Coulson *et al.*'s list, the list in Table 1 shows *G. leporina* to be particularly abundant and species of the genus *Clubiona* to be unexpectedly absent. The absence of *Pirata* species is because Danby Low Moor is dry, without boggy areas, but the comparative frequency of both *X. sabulosus* and *M. gulosa* is unexpected since neither species was recorded by Coulson *et al.* (1984). The former is scarce in Britain (Locket & Millidge, 1951), whilst the latter is particularly associated with upland habitats (Locket & Millidge 1953). Both Coulson *et al.*'s study and the present one indicate that there is a number of species that can be trapped abundantly in the upland heaths and that can be considered to be nationally rare or of limited distribution; the commonest species in the Danby Low Moor traps, *G. leporina,* is described by Locket & Millidge (1951) as being 'local'. Coulson & Butterfield (1986) gave a table of 14 spiders which they considered to be montane or submontane species; only two of these were collected in the present study. *P. mengei* was collected by Coulson and Butterfield from a variety of altitudes up to 699m above sea level. Interestingly, their only *M. gulosa* were in the 500-599m range in the Pennines; Danby Low Moor appears to be at a particularly low altitude for this species. One notable difference between the arachnids of Danby Low Moor and Coulson and co-workers' seven North York Moors sites is the species poorness of harvestmen; their sites had between 5 and 8 species, including *Mitopus ericaeus* at 6 of the sites. Although several *Mitopus* from Danby Low Moor were examined, they all appeared to be *M. morio*.

There are three features of this study that have relevance to the conservation of upland heathlands. First, concepts of commonness and rarity may need to be modified as more is known about the arachnid fauna of upland heathlands. Compared with lowland heathlands the fauna is still comparatively unknown, and the communities in most urgent need of conservation are largely unknown. Second, even in the centre of burnt or cut areas, there is a substantial number of arachnids moving about. There is evidence that some of the species in these open areas are apparently much scarcer, or even absent, in the uncut or unburnt heathland. Arthropods in these open areas may be more easily found by foraging heathland birds, such as grouse chicks or golden plover, than the arthropods beneath *Calluna* stands. Third, there is a marginal effect, whereby a number of species are trapped most frequently at or near the margin between burnt and unburnt, or cut and uncut heather. Although there is no distinct marginal community, with species that occur on the margin and nowhere else, the margins affect both the diversity and abundance of the spider community.

Although this study concentrates on only two ages of heathland, the results imply that the mosaic of different ages of *Calluna* stands is as important for the arthropods as it is in the management of vertebrates, such as grouse (Usher & Gardner 1988). The evidence, based on pitfall traps, suggests that the spider diversity of a large area of heathland with a mosaic of developing *Calluna* of different ages is likely to be greater than the diversity of a large, even-aged *Calluna* stand. Figs. 2 and 4 demonstrate that some spider species are mostly associated with mature *Calluna,* whilst others appear to be associated with open areas, exposed after fire or cutting. However, the widespread adoption of cutting rather than burning may have long term implications for the arachnid fauna. Although the species complements may be similar, the reduction in abundance of spiders may mean that cut heathland is less acceptable for feeding heathland birds than burnt heathland. Conservation of the upland heathland communities appears to depend upon maintaining the mosaic of *Calluna* stands of different age, and probably to favour burning over cutting.

Acknowledgements

We should like to thank the British Ecological Society for the award of a Small Ecological Project Grant (No. 522) which funded this short-term study. Mr I. V. Brett allowed access to Danby Low Moor, Mr Keith Lord undertook the burning, Dr R. W. Brown of the North York Moors National Park Department arranged for the cutting, Mr Clifford Smith helped with checking the spider identification, Dr Sarah Gardner commented on a draft, and Mr Matthew Chatfield set out the transects of traps; we should like to thank all of these people.

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LIMONIA (RHIPIDIA) CTENOPHORA (LOEW) – A CRANE FLY SPECIES NEW TO YORKSHIRE

J. A. NEWBOULD

The week August 16th to 21st 1987 was hot and humid ending with a thunderstorm and heavy rain on Saturday August 22nd. Most evenings I operated a moth trap either in my garden or with Mr Harry Beaumont on various YWT Nature Reserves. On Friday August 21st, I was using a Mercury Vapour light with a sheet at home, Listerdale, Rotherham (SK467917). Some 300 metres to the north is some secondary woodland whilst 300 metres south is a mixture of arable and ley farmland. Adjacent are my neighbours' gardens. In addition to 25 species of moths I collected a number of other insects and delivered these to Mr W. A. Ely the following day. I was very surprised to find that in addition to *Tipula scripta*, the crane fly *Limonia ctenophora* which is a species of damp wet woodlands had been collected. The subgenus Rhipidia is characterised by its pectinate antennae. This species has only previously been recorded in Cambridgeshire, Hertfordshire and Hampshire, i.e. a distribution in southern England. The species is officially considered to be vulnerable, i.e. it will become in danger of extinction in this country if causal factors continue to operate. It is included in the Red Data Book (Shirt 1987) as a grade 2 species. The specimen has been confirmed by the national recorder, Mr Alan Stubbs, and the voucher specimen has been deposited in the collection of Rotherham Museum. I am indebted to W. A. Ely for the identification and assistance with this note and to P. Skidmore for confirming that it is the first Yorkshire record.

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BOOK REVIEWS

Animal Architecture and Building Behaviour by **Michael H. Hansell.** Pp. 324, with numerous b/w and colour illustrations. Longman. 1988. £9.95, softback.

Many animals construct artifacts. These range from traps, such as spiders' webs, through nests that protect the eggs and young of birds, to a diversity of structures permanently inhabited by their makers, such as caddis cases, the often complex homes of social wasps, termite mounds and beaver dams. The materials used are also various. Some, such as silk and mucus, are produced by the builders: others, such as sticks, stones, mud, and leaves, are collected. Such diversity offers much of interest to the

naturalist and presents many problems to the student of behaviour. It is therefore helpful to have a compendium of examples and a survey of some of the challenges they offer presented in this soft-backed edition of a book published in 1984.

An overview of the builders, the kinds of structures they make and how they make them, the functions of their constructions, and the materials they use, comprises the first half of the work. A large amount of information, much of it very interesting, is presented, but the often catalogue-like sequence, though inevitable, I found tedious, and the omission in most cases of any mention of where the various animals are to be found in the world is surely a shortcoming.

The rest of the book deals with such a novel topic as the deduction of behaviour from the fossil record, and proceeds to a discussion on the control of building and various speculations of an evolutionary nature. These latter, while including interesting material, were, I felt, sometimes vague and, like the last chapter, occasionally trival. Presentation is not helped by the persistent and irritating way in which things 'do show' or material 'does provide' rather than shows or provides, but the volume, with its many illustrations and copious bibliography, can be recommended as a valuable source of information to anyone interested in animal architecture.

GF

The Ecology of Animal Movement Edited by **I. R. Swingland** and **P. J. Greenwood.** Pp xvi + 311 including figures. Clarendon Press, Oxford. 1984. Paperback £12.50.

Animal movement can be broken down into two components, namely, why move? and what are the consequences of movement? The editors seek to answer these questions through twelve contributions by experts on various complementary aspects of movement. The topics covered include optimal foraging, home range size and energetic requirements, dispersal theories, small mammal dispersal, insect migration, correlates of colonizing ability and function of distance movements. The book not only puts forward contemporary ideas on movement but also incorporates reviews of previous work supported by a comprehensive bibliography. This is a book for the specialist or advanced student with interests in evolutionary ecology, for whom it is a mine of useful and stimulating information.

MJD

Dinosaurs Past and Present, edited by **Sylvia J. Caerkas** and **Everett C. Olson**. Volume II. Pp. 164, fully illustrated. University of Washington Press. 1988. $35.00

This is the second of two volumes presenting papers from a symposium at the Natural History Museum of Los Angeles County. (The first was reviewed in *The Naturalist* **112:** 132.) The symposium and an accompanying exhibition examined changing interpretations of the appearance of dinosaurs and of their ways of life. The longest paper in this volume discusses how restorations of dinosaurs should be made: how the skeleton would have been held in natural postures and how the soft tissues would have enclosed it. Another paper traces the history of pterosaur restorations from the clumsy, broad-winged, bat-like early illustrations to the fast-running, narrow-winged ones in Kevin Padian's papers. A third argues that *Stegosaurus* had a single row of plates on the back, not the double row shown in most restorations. Other papers are about a group of fossil dinosaur nests and about evidence that some dinosaurs survived the catastrophe at the end of the Cretaceous. There is much interesting material but most of it is neither argued rigorously enough to satisfy specialists nor presented attractively enough to hold the attention of general readers. This volume, like the first, includes many beautiful and unconventional paintings of dinosaurs.

RMcNA

WEST MOOR AND ITS BOTANICAL RECORDS

MARTIN LIMBERT
Museum and Art Gallery, Doncaster

Introduction

Although interest in the peatlands situated east of Doncaster centres largely on Thorne Moors, and to a lesser extent on Hatfield Moors, a third site of significant size once existed in close proximity to the latter moorland. This was West Moor, a few kms westwards of Hatfield Moors. The former moorland, which lies barely above sea level, is now intensively farmed (see Grant 1970, Rhodes 1988). Walking its fields and green lanes reveals little of its earlier history, although the rich black soils of the largely hedgeless fields indicate that there is an admixture of peat, and that the area was once of much greater botanical interest than it is today. A few pressed herbarium specimens and written records encapsulate almost all of our knowledge of this moorland both before, and for several decades after, drainage took place in the early nineteenth century. These details are, *inter alia*, summarised here, the nomenclature following Dony *et al.* (1986) and Smith (1978).

Historical Outline

West Moor is situated in a natural and almost circular basin on the Sherwood Sandstones. This landscape feature is readily detected on Ordnance Survey maps, where the few contours of the area mirror its circular shape. The depression is 2.4 kms in diameter, and has been the subject of several theories to explain its origin. Jarvis (1973) commented that its characteristic form may be due to the presence of a half-buried remnant of glacial ice, around which glacifluvial sands and gravels were deposited. More recently. Gaunt (1981) has suggested that the feature, which is regarded as being of Devensian age, is probably an alas. During periglacial conditions, alases appear to be initiated by the formation and subsequent melting of closely spaced ice-wedges in the ground, followed by the collapse of intervening mounds and ridges to form a depression. The early stages of this are associated with the destruction of vegetation cover, which accelerates localised melting of both permafrost and the ice-wedges. West Moor exists in a sandy region, though the sediments within the depression, which comprise loam, clay and sand, form a diverse pattern arising from former tidal circulation. They are described by Jarvis (1973) and Carroll *et al.* (1979).

The poor drainage qualities of such a site led, perhaps inevitably, to the formation of peat as vegetation began to flourish, and the annual cycles of growth and decay became established. A fen-carr peat was initiated, a reed-swamp deposit predominantly composed of *Phragmites australis* (Cav.) Steudel, with fragments of *Betula pubescens* Ehrh. (Jarvis 1973).

Human activity on West Moor in its unreclaimed state is very poorly documented, with the located references mostly centred on common rights, including turbary; for example, a decree and award issued in 1630 (see Bunting *et al.* 1969) concerning the rights and privileges of the tenants and inhabitants of the manor of Hatfield, noted that they were to receive common rights on two defined areas elsewhere in exchange for 403 acres (161 ha.) of West Moor. The document also notes that the tenants and inhabitants 'may have and enjoy' several 'parcels of common', including what was, presumably, the remainder of West Moor, described as amounting to 893 acres (357 ha.). A drain 'about the West Moor' (the surviving Dutch Dyke?) was also alluded to, which, it was stated, had to be completed by late August 1631.

By the late eighteenth century, extensive parts of West Moor were still largely untouched by drainage, peat winning or reclamation. However, Jeffery's map of the region, dated 1771, suggests that the western and southern parts of the moorland had

been significantly affected by encroaching reclamation. Nevertheless, the region remained 'oppressed with Water', as Huggin Carr, between Hatfield Moors and West Moor, was described in 1776 (Smeaton 1776). This situation began to change in the early years of the succeeding century. Drainage was catalysed by the passing of the Hatfield, Thorne and Fishlake Enclosure Act in 1811. The exact years of the drainage of West Moor have not been ascertained, but must have predated 1825, when the Enclosure Award was completed. The Doncaster sheet of the Old Series one inch O.S. maps was surveyed 1838–40, and the south-east quadrant of this map, published February 1841, shows West Moor intersected by lanes and drains, and presumably then effectively drained (Limbert 1984).

Botanical Records

The botanical records of ancient West Moor are minimal, but full of interest. The only located contemporary records are included in those of William Pilkington from 1790 to 1816. Skidmore (1980) has listed Pilkington's records from Yorkshire and adjoining counties, and has also provided available biographical details. The records which concern, or may concern, West Moor, are listed below. Definite references to Hatfield Moors are excluded, although all square-bracketed species, except the gentian, are known from this latter moorland:

Stellaria graminea L.: 'West Moors at Hatfield'.
[*Potentilla erecta* (L.) Räuschel: 'Turf moor at Hatfield'].
Erica tetralix L.: 'West Moors at Hatfield'.
E. cinerea L.: 'West Moors at Hatfield'.
[*Vaccinium oxycoccos* L.: 'Turf bogs near Hatfield'].
[*Andromeda polifolia* L.: 'Turf bogs at Hatfield'].
Hottonia palustris L.: 'Ditches on the West Moor, Hatfield' (? suggesting drainage in progress by at least 1816).
Anagallis tenella (L.) L.: 'On the West Moor, Hatfield'.
[*Gentiana pneumonanthe* L.: 'In the Whin bushes between the West Moors and the Lings Hatfield'].
Pinguicula vulgaris L.: 'in a moist ditch West Moor, Hatfield'.
Lonicera periclymenum L.: 'Thickets at the side of West Moors at Hatfield'.
Narthecium ossifragum (L.) Hudson: 'Sides of West Moor next to the Lings at Hatfield'.
Juncus squarrosus L.: 'West Moor at Hatfield'.
[*Eriophorum vaginatum* L.: 'Turf bogs at Hatfield, June 1796'].
[*Rhynchospora alba* (L.) Vahl: 'Turf bogs near Hatfield 9 August 1790'].

There are no further located references for about a century, until 1898. In that year, the Yorkshire Naturalists' Union visited several Doncaster localities, including West Moor, on 30th May. The excursion circular issued before the meeting contained a botanical section by Dr H. H. Corbett, who commented:

> West Moor is a portion of the old fen country that formerly occupied much of the lower lands of the Don and Trent watersheds. It is now entirely under cultivation, but remnants of the old flora linger in the numerous ditches.

Besides 'séveral interesting species of *Potamogeton*, *Carex*, etc.', Corbett listed four further survivors: *Ranunculus lingua* L., *Hottonia palustris*, *Eupatorium cannabinum* L. and *Hydrocharis morsus-ranae* L. Unfortunately, no excursion report was produced, although details of diatoms collected (some from *Myriophyllum*) were subsequently published (Coombe 1899, Stiles 1900). During 1898, Corbett visited West Moor on at least two additional dates, 19th May and 17th July. The herbarium at Doncaster Museum contains seven specimens obtained by Corbett from 'West Moor', all collected in July of that year, except the mouse-ear (in May). Some more precise details of location, where given, are included in the list below:

Ranunculus lingua
R. circinatus Sibth.: 'Gathered in the dyke beside the lane leading from Thorne Road to Armthorpe'.
Cerastium arvense L.: 'Gathered on an old peat bog'.
Torilis japonica (Houtt.) DC.
Aegopodium podagraria L.: 'Gathered in the lane leading from Thorne Road to the moor'.
Heracleum sphondylium L.
Hydrocharis morsus-ranae

Doncaster Scientific (now Naturalists') Society undertook a number of excursions which included West Moor in the first half of the present century. However, the only located records arising from these visits emanate from the Society's relevant minute book, which records a joint meeting with Sheffield Naturalists' Society to Armthorpe and West Moor on 14th May 1904. Those attending the event saw *Moenchia erecta* (L.) P. Gaertner, B. Meyer & Scherb., *Genista anglica* L., *Carum carvi* L. and *Pyrola minor* L., the latter, however, not in flower. It is unfortunate that the precise locations of these species were not given.

Modern botanists have inherited a meagre legacy on West Moor, although there are fading echoes of former interest. *Ranunculus lingua* was seen in flower as recently as 1985, along West Moor Drain, but it is now probably banished by watercourse management. In the same drain, *Physcomitrium pyriforme* (Hedw.) Brid., *Cratoneuron filicinum* (Hedw.) Spruce and *Hottonia palustris* persist, but have an uncertain future. Between West Moor and Carr Side, on the edge of a quarry working a cryoturbated deposit of sand and coarse gravel referred to the 'Older River Gravels' (Magilton 1978), a few plants of *Erica cinera* still grow with *Calluna vulgaris* (L.) Hull at what is probably the former species' last Doncaster station.

Acknowledgements

I am grateful to Doncaster Naturalists' Society for permission to use, and quote from, their minute books. Derek Allen's card-index of D.N.S. excursions 1896–1985 (see Allen 1985) was helpful in identifying the Society's excursions which encompassed West Moor. Colin Wall kindly provided the significant moss records from West Moor Drain.

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Y.N.U. BRYOLOGICAL SECTION: ANNUAL REPORT 1986–1987

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Sectional meetings during 1986 and 1987 have been held as follows:

Spring 1986 — Houghton Woods (VC 61), April 5
Summer 1986 — Wadworth, near Doncaster (VC 63), September 6
Spring 1987 — Helmsley & Howldale (VC 62), April 4
Summer 1987 — Ingleton (VC 64), September 5.

These meetings are reported fully elsewhere (Blockeel 1987a, Blockeel and Wall 1988). Additionally, the Autumn Meeting of the British Bryological Society was held in Leeds on September 20–21 1986 and included an excursion to the Washburn Valley and Birk Crag near Harrogate (Blockeel 1987b).

Literature

Wall and Limbert (1987) have performed a very useful service in drawing together all the known bryophyte records for Thorne Moors. It is hoped that this paper will act as a stimulus for further exploration of this important but threatened locality.

Records

Records have been received from Mr C. Wall and Mr P. C. Bowes. Some batches of specimens have also been received from Dr M. B. Usher (University of York) as a result of his research on the North Yorkshire Moors. Recorders' initials: T.L.B. = T. L. Blockeel, P.C.B. = P. C. Bowes, M.B.U. = M. B. Usher, C.W. = C. Wall. An asterisk indicates a new V.C. record or an amendment to the *Census Catalogue*.

Anthoceros agrestis: (63) 44/60 Arable field, Dunsville, near Doncaster, C.W., Aug 1987.
Ricciocarpos natans: (63) 44/61 On rotting bark and other detritus, Railway Delph ponds, Thorne Ashfields, C.W., Nov 1986
Riccia fluitans: (63) 44/71 Submerged in pond on peat, Paraffin Works Cuttings, Thorne Moor, C.W., Oct 1985; on rotting bark and other detritus, Railway Delph ponds, Thorne Ashfields. C.W., Nov 1986.
Metzgeria conjugata: (63) 43/58 On Magnesian Limestone, Anston Stones Wood, T.L.B., Feb 1986.
Blasia pusilla: (63*) 44/60 Sandy bank of ditch in birch wood, Barnby Dun, C.W., Jan 1986.
Lophozia sudetica: (63) 43/19 On peat among grit rocks, Cranberry Clough, Upper Derwent Valley, T.L.B., Nov 1986.
Lophozia perssonii: (63) 44/51 Magnesian Limestone quarry south of Kirk Smeaton, C.W., Aug 1987.

Lophozia bicrenata: (63) 43/29 On bare ground on track, Agden Reservoir, T.L.B., Oct 1987.

Mylia anomala: (63) 43/19 With *Sphagnum papillosum* in bog, Cranberry Bed, Upper Derwent Valley, T.L.B., Jul 1987.

Chiloscyphus pallescens: (63) 44/50 On soil, Levitt Hagg, Don Valley, C.W., Mar 1986.

Saccogyna viticulosa: (63) 43/19 On wet rocks, Abbey Brook, Upper Derwent Valley, T.L.B., Dec 1986.

Scapania gracilis: (63) 43/28 Rivelin valley, C.W., Mar 1987.

Porella cordaeana: (64) 44/35 On base of tree by R. Nidd, Nidd Gorge, Knaresborough, T.L.B., Mar 1987.

Cololejeunea calcarea: (64) 44/35 On base-rich grit, Nidd Gorge, Knaresborough, T.L.B., Mar 1987.

Cololejeunea rosettiana: (64) 44/35 On base-rich grit, Nidd Gorge, Knaresborough, T.L.B., Mar 1987.

Sphagnum papillosum: (63) 44/31 Boggy ground on Coal Measures, Woolley Moor, T.L.B., Jul 1987.

Sphagnum magellanicum: (62) 45/70 Lealholm Moor, M.B.U., 1987.

Sphagnum quinquefarium: (63) 43/28 Rivelin Valley, C.W., Mar 1987.

Sphagnum compactum: (62) 44/89 Fylingdales Moor, M.B.U., Jul 1987; 45/60 Westerdale Moor, M.B.U., July 1987.

Sphagnum tenellum: (62) 45/70 Lealholm Moor, M.B.U., 1987; 44/89 Fylingdales Moor, M.B.U., July 1987.

Andreaea rothii var. *papillosa*: (63) 43/29 On a boulder in block scree, head of Howden Dean, Howden Moors, T.L.B., Dec 1987.

Dicranella subulata: (64) 44/06 Edge of Grimwith Reservoir, M. M. Hartley and M. Dalby, Dec 1974 (KGY).

Dicranum montanum: (63*) 43/38 On birch trunk, Ecclesall Wood, Sheffield, T.L.B., Jan 1986; (64) 44/35 On rotting branch, Nidd Gorge, Knaresborough, T.L.B., Feb 1987.

Campylopus brevipilus: (62*) 45/70 Egton Moor, M.B.U., Jul 1987.

Fissidens viridulus: (62*) 44/58 On soil in shade, Rievaulx Abbey, E. V. Watson, 1967 (*Bull. Brit. bryol. Soc.* **50**: 22).

Aloina brevirostris: (64) 44/43 On bare spoil heap, Magnesian Limestone quarry, New Micklefield, T.L.B., Sep 1987.

Leptobarbula berica: (61*) 54/34 Growing in the bowl of what appeared to be an old stone font in the churchyard of St German's church, Winestead, near Patrington, R.Lewis, Dec 1948, as *Gyroweisia tenuis*, re-det. H. L. K. Whitehouse (BBSUK); (63*) 44/51 Detached stones, S. side of R. Went, Brocodale, G. A. Shaw, Mar 1972, det H. L. K. Whitehouse (herb A. C. Crundwell); 44/41 Moist stonework by drain, Wentbridge church, T.L.B., Dec 1986; (64*) 44/43 Old Magnesian Limestone quarry near Garforth, J. Appleyard, Mar 1954 (Appleyard, Hill and Whitehouse 1985); 44/43 On loose Magnesian Limestone stone on floor of disused quarry in woodland, Hook Moor near Garforth, H. L. K. Whitehouse, May 1986. New to Yorkshire.

Trichostomum brachydontium: (61*) 44/93 Chalky soil under trees Brantingham Dale, T.L.B. and C.W., Apr 1986.

Trichostomopsis umbrosa: (64*) 44/42 On shaded steps in churchyard, Ledsham, T.L.B., Sept 1987. New to Yorkshire.

Pohlia muyldermansii: (64*) 34/75 On clay soil in seepage area in pasture, Stocks, M. J. Wigginton, 1986 (*Bull. Brit. bryol. Soc.* **50**: 24).

Plagiobryum zieri: (63) 43/19 on ledge on wet base-rich cliff, Abbey Brook, Upper Derwent Valley, T.L.B., Dec 1987.

Bryum pallescens: (64*) 34/66 On soil in crevice of slate scar, Catlow Fell, Bowland, M. J. Wigginton, 1986 (*Bull. Brit. bryol. Soc.***50**: 24).

Bryum tenuisetum: (64*) 44/24 On exposed mud, Lindley Wood Reservoir, A. C. Crundwell et al., Sep 1986.

Plagiomnium affine: (61*) 44/87 Amongst grass, under hedge on sandy soil, Thorpe Bassett, O. M. Crowson, 1969 (*Bull. Brit. bryol. Soc.* **50**: 25).

Philonotis calcarea: (63) 43/19 On wet base-rich cliff, Abbey Brook, Upper Derwent Valley, T.L.B., Dec 1987.

Zygodon conoideus: (63*) 43/19 On weakly base-rich grit boulder, Abbey Brook, Upper Derwent Valley, T.L.B., Dec 1987. An unusual occurrence of a normally epiphytic species.

Orthotrichum affine: (63) 44/51 On Crack Willow, Shirley Pool, Askern, C.W., Apr 1987.

Orthotrichum rivulare: (64) 44/35 Base of tree by R. Nidd, Nidd Gorge, Knaresborough, T.L.B., Mar 1987.

Ulota crispa: (64) 44/35 One tuft on tree trunk, Nidd Gorge, Knaresborough, T.L.B., Mar 1987.

Ulota phyllantha: (61*) 54/26 Old Ash, bed of Danes' Dyke, Flamborough, C.W., July 1987.

Homalia trichomanoides: (63) 43/58 On shaded Magnesian Limestone, Anston Stones Wood, T.L.B., Feb 1986.

Anomodon longifolius: (63*) 43/58 On shaded Magnesian Limestone, Anston Stones Wood, T.L.B., Feb 1986. For a fuller account of this species in Yorkshire, see Blockeel (1987c).

Isothecium myurum: (63) 43/58 On shaded Magnesian Limestone, Anston Stones Wood, T.L.B., Feb 1986.

Cirriphyllum piliferum: (63) 44/50 Woodland floor, Sprotborough Plantation, C.W., May 1985.

Plagiothecium laetum: (62*) 44/89 Steep wooded escarpment, Crosscliff, Dalby Forest, P.C.B., Apr 1986.

Plagiothecium nemorale: (63) 44/50 Melton Wood, C.W., Jan 1986.

Hypnum mammillatum: (62*) 45/70 On a log by the river, Arnecliffe Wood, E. V. Watson, 1967 (*Bull. Brit. bryol. Soc.* **50**: 26).

Rhytidiadelphus loreus (63) 44/71 Flooded carr-woodland, Will Pits, Thorne Moor, C.W., Nov 1987.

CORRECTIONS

Lophozia ventricosa var. *longiflora*: (64) The specimen from wet shale, Coldstone Beck, Burley Moor (BBSUK), has been re-determined by Mrs J. A. Paton as *L. ventricosa* var. *ventricosa*. Var. *longiflora* is therefore unknown in Yorkshire.

Plagiochila exigua: (65) The specimen from Bracken Gill, Dentdale (BBSUK) is *Leiocolea alpestris* (conf. D. G. Long). *P. exigua* is otherwise recorded in Yorkshire only from the Ingleton Glens.

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DIPTERA REPORT: 1985-86

P. SKIDMORE

In the last Diptera Report (Skidmore, P. 1985 Diptera Report: 1977–84 *Naturalist* **110:** 111–117), I observed that although a huge amount of collecting had been done in Yorkshire, the records were not being sent to me and hence were not being entered on the Y.N.U. Diptera Card Index. Clearly the comments did not fall on stony ground since an almost embarrassing amount of data has been forthcoming during 1985 and 86. The major contribution in 1985 came from Peter J. Chandler who sent perhaps 1500 records of some 250 species of Mycetophilidae from all over the county. In 1986 superb contributions came from Alan Stubbs (Tipulidae, mainly from North Yorkshire), Alan Brindle (Tipulidae, mainly from VC. 64), Geoff King (mainly from Pickering area, including many Chironomidae new to the County), Roy Crossley (numerous empidoid records, mainly from the Otley area), John D. Coldwell (Barnsley area Syriphidae etc.), Roger S. Key (mainly from North Yorkshire), David Maude (Huddersfield area) and the usual extensive lists from Bill Ely from all over Yorkshire. However, the largest single contribution in 1986 came from David J. Henshaw of Waltham Abbey, Essex, who very kindly sent me his annotated computer print-out of the Malham Tarn Diptera List, which he continually updates. Out of the 1030 species on the list, 208 were not on the Yorkshire cards. Readers of the *Naturalist* will not perhaps be surprised to learn that 113 of these belonged to the Phoridae, the results of Dr R. H. L. Disney's superlative work on that family, initiated during his term of office at Malham Tarn Field Centre. Henry's infectious enthusiasm however spills over into most families of Diptera and his years at Malham proved the greatest boost to Yorkshire Diptera recording. Indeed Diptera recording around the Field Centre was a major objective and numerous courses were organised by him, at which the leading Dipterists in the country traditionally gathered. Malham Tarn consequently became perhaps the best-worked site in Britain for Diptera. In view of this I was surprised to find that on my only visit to the Tarn on 9 July 1957 I took two flies, *Thereva lunulata* Zett. and *Gymnomera tarsea* (Zett.) which were not on the Malham List. Furthermore, in the massive body of data on Yorkshire Tipulidae from Alan Brindle were another four species also lacking from the Malham List, namely *Erioptera diuturna* (Walker), *E.divisa* (Walker), *Gonomyia lucidula* Meigen and *G. simplex* Tonnoir. Malham Tarn is evidently not exhausted yet.

The huge increment of records sent to me during 1985 and 1986, amounting to perhaps 500 species new to the county, prompted me to carry out a statistical review of the present state of Diptera recording in Yorkshire in the hope that this would provide pointers for future research. The results of these deliberations are briefly itemised below.

a) There are currently about 6150 Diptera on the British List and the Y.N.U. Card Index contains records of 3173 of these (about 52 per cent).

b) The ten best-worked families containing over 50 British species are listed in Table 1, with the appropriate county and national totals, and the corresponding percentages. The results suggest that about 70 percent of the entire British dipterous fauna can be reasonably expected to occur in Yorkshire. Hence about 4300 species may occur in the county; so at least 1100 species remain to be discovered.

c) Table 2 lists the remaining 16 families of British Diptera which comprise over 50 species nationally, and the details are arranged as in Table 1. These however are the lesser-known families and it will be seen that the largest family of all, the Gall-midges or Cecidomyiidae, is by far the least worked, only 114 of the 640 listed British species (or about 18 per cent) having been recorded in Yorkshire.

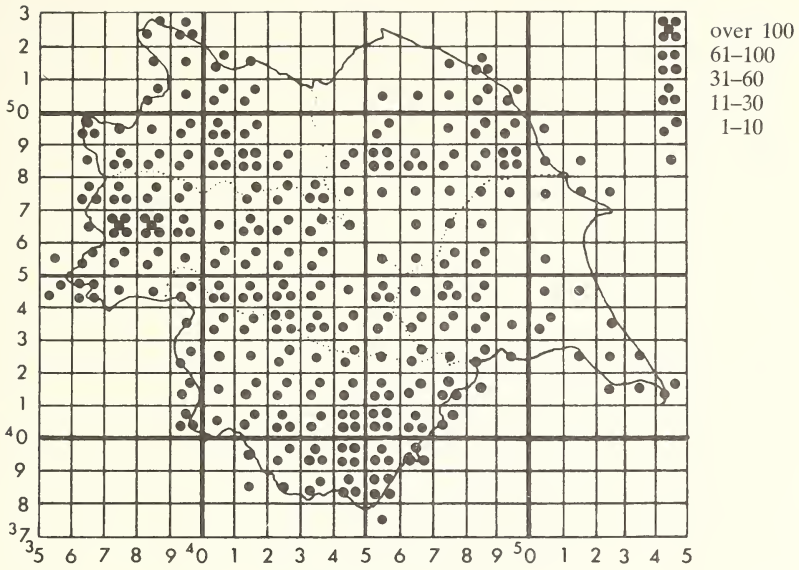
TABLE 1
The best-worked families of Diptera which contain over 50 British species.

Family	Yorks	National	Yks/Nat %
Tipulidae	239	306	78
Stratiomyidae	35	51	69
'Empididae'	246	367	67
Dolichopodidae	175	268	65
Syrphidae	181	253	71
Heleomyzidae	39	61	64
Sciomyzidae	53	64	83
Chloropidae	98	155	63
Scathophagidae	38	54	70
Muscidae	185	278	66
Totals	1289	1857	69

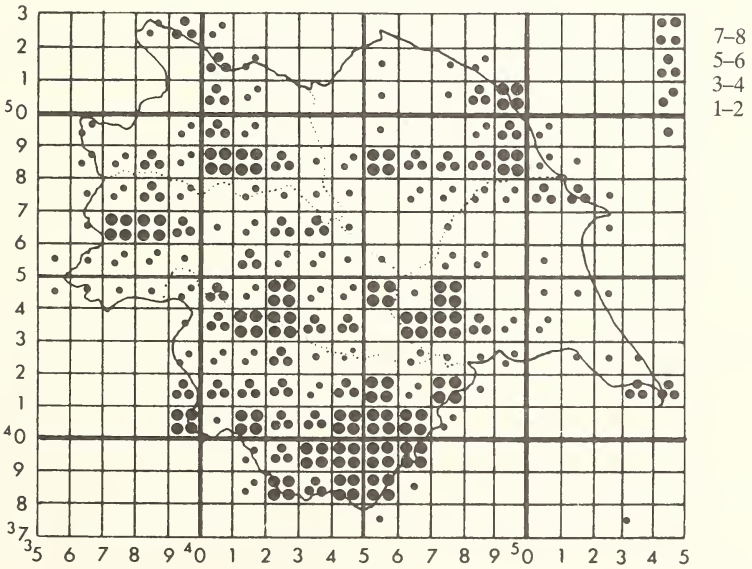
TABLE 2
The lesser-worked families of Diptera which contain over 50 British species.

Family	Yorks	National	Yks/Nat %
Psychodidae	40	78	51
Ceratopogonidae	63	158	40
Chironomidae	245	467	52
Mycetophilidae	257	452	57
Sciaridae	38	97	39
Cecidomyiidae	114	637	18
Phoridae	139	293	47
Pipunculidae	44	76	58
Tephritidae	45	76	59
Sphaeroceridae	64	108	59
Ephydridae	62	134	46
Agromyzidae	105	332	32
Tachinidae	65	241	27
Sarcophagidae	24	56	43
Anthomyiidae	117	221	53
Fanniidae	32	59	54
Totals	1454	3485	42

The above clearly indicates the families of Diptera most demanding of attention, but it was also felt desirable to ascertain the areas of the county which had been least surveyed for Diptera. This problem was addressed by producing composite maps for a well-worked family and a selection of ubiquitous, well-recorded flies. Map 1 shows the distribution of records of Crane-flies or Tipulidae in Yorkshire, indicating the extent of our knowledge of the species in each 10 km square in the county. Map 2 shows the current records for 8 of our best recorded and commonest flies (i.e. *Tipula oleracea, Limonia tripunctata, Cheilotrichia cinerascens, Empis tessellata, Dolichopus ungulatus, Platycheirus albimanus, Eristalis tenax* and *Lyciella rorida*).



Map 1. Composite Map of records of Yorkshire Tipulidae showing numbers of species recorded in each 10 km. square.



Map 2. Composite Map showing records of eight common species of Diptera in Yorkshire, with the number of these found in each square.

d) Maps 1 and 2 show remarkably close correlation in highlighting the large unrecorded areas in VC. 61 and VC. 62, but also the poor level of recording over many other parts of the County. Most 10 km squares in the county should have between 61 and 100 species of Craneflies, with over 100 in at least the majority of the more topographically varied ones. All the 10 km squares in Yorkshire should have all of the 8 ubiquitous species plotted in Map II.

I wish again to thank all who have sent Diptera records whether they have been new county records or records of the most common species. All are vital in building up a picture of the dipterous fauna of Yorkshire.

BOOK REVIEWS

Living Underground: A History of Cave and Cliff Dwelling by **David Kempe.** Pp. 256, including numerous b/w photographic plates and outline maps. The Herbert Press, London. 1988. £18.00.

In these days of rising house prices and gazumping, the alternative life style has a certain attraction. Here you can read about castles under hills, cottages and caves or hermitages in holes. Both interiors and surroundings are described from all around the world including Britain. Examples are from both ancient and recent times and illustrated by numerous black and white photographs. The artistic and religious activities pursued in such underground dwellings are discussed in separate chapters.

The book does not have the colour illustrations demanded by the 'yuppy' coffee table. However it is on such an intriguing subject that if left around, it will be eagerly grabbed by visitors who will undoubtedly extract unusual and interesting facts with which to regale their hosts at dinner.

DHSR

Immigrant Killers. Introduced predators and the conservation of birds in New Zealand by **Carolyn King.** Pp. 224, including numerous line drawings, maps, monochrome and colour photographs. Oxford University Press. 1985. £35.

This is a fascinating account of the history of the fauna and vegetation of New Zealand, together with proposals for the appropriate conservation measures to be adopted in the light of the past activities of man. The author first considers the ecological situation in New Zealand before man arrived. She then examines the three human immigrant invasions. The Polynesians, who included the Maoris, were the first to arrive; they brought with them a rat *(Rattus exulans)* and a dog. They carried out limited deforestation but, most seriously, exterminated 32 species of birds. Next came the early European immigration (1769–1884). They brought about extensive deforestation. With these Europeans came, often unintentionally, a varied mammal fauna including rats *(R. norvegicus, R. rattus),* domestic cats (which became feral), rabbits, deer and pigs. The later European immigration from 1884 was concerned with the development of pastoralism, with exotic species, including muskelids (weasel, stoat, ferret) still arriving. Dr King has worked for many years on these animals and it is perhaps not surprising that her account should turn a critical eye on these and other predators. She argues the pros and cons of predator control and comes down, by logical argument, in favour of limited predator control.

The book provides a unique insight and refreshing approach to the New Zealand fauna and is to be warmly recommended to a wide natural history readership. The account is supported by numerous excellent line drawings and photographs. It is a mine of factual information, with a comprehensive bibliography. Possibly the chapter on introductions to other islands was a bit out of place as space did not permit justice to be done to this. A few maps showing the spread of introduced species and possibly

patterns of decline of native ones would have helped. The title is unfortunate as there is so much more to the book than it suggests. In spite of these minor shortcomings the book is a most useful addition to the natural history of New Zealand.

MJD

Life in the Cold: An Introduction to Winter Ecology by **Peter J. Marchand.** Pp. xvi + 176, including numerous line drawings, tables & b/w photographic plates. University Press of New England, Hanover, USA. 1987. $18.00 cloth, $9.95 paperback.

Have you ever shivered on a cold winter's day in England and wondered how the Inuit (Eskimo) manage to go fishing on an Arctic evening or considered why your dahlias are killed by frost when the pine trees around you on an alpine skiing holiday show no damage? This book provides answers within the extent of our current knowledge.

The text is identifiably American in style but nevertheless imparts information in a readable way. The figures are clear and usefully supplement the text. Only in Figure 39 was I frustrated by being presented with the Latin names of 3 North American weasels while the text gives only common names.

This little volume brings together a host of interesting facts. It provides an excellent introductory account of adaptations by the animals and plants which must survive in extreme climates. The more familiar organisms that avoid such conditions by hibernating or migrating are only mentioned in passing. The paperback version of this book has the advantage of being stitched rather than 'perfectly bound'. At least this means that when the glue on the spine softens in the sun (as happened with my copy), the pages do not fall out.

DHSR

A Love of the Lakes, with photographs by **Geoffrey Berry** and text by **Brian Redhead**. Pp. 189, including 80 full colour plates and 2-page map. Constable. 1988. £14.95.

This superbly illustrated book contains many splendid coloured photographs of all the Lakes by the late Geoffrey Berry, showing their varying moods during all four seasons of the year. The introductory text is compiled by Brian Redhead in reminiscent vein and there is a useful brief description accompanying each photograph. A helpful map is also included.

I have an intimate knowledge of Derwent Water and its surrounding area and a more superficial knowledge of the rest of the Lake District. The book successfully reminds me of the places I have visited and encourages me to increase my acquaintanceship with the rest. It will certainly have a similar effect on almost everyone who turns its pages.

MET

A Natural History of Domesticated Animals by **Juliet Clutton-Brock**. Pp. 208, with numerous colour and monochrome illustrations. Cambridge University Press and British Museum (Natural History). £9.95 paperback.

In this book the author examines the domesticated mammals under five broad categories, viz. the 'man-made' animals (e.g. dogs, cattle, sheep, pigs), exploited captures (e.g. elephants, camels, reindeer), small mammals, exploited ungulates in the Pre-Neolithic period and experimental game ranching, past and present. This broad canvas incorporates all aspects of domestication. It takes species individually and traces from their wild progenitors the course domestication could have followed and the sequence of changes in the biological attributes in the present day descendant. As an integral part of this the authoress takes account of how man has changed from being a predominantly hunter-gatherer of 10,000 years BP to the urban dweller and more mechanical farmer of today. While the 'man-made' species have experienced considerable change, the exploited captives, in which interestingly the cat is included, show little change in their characteristics with time. For the small mammals, positive domestication has taken place for ferrets, rabbits, guinea pigs, dormice and golden hamsters. Furthermore, the close domestic association of rats and mice with man has justified their inclusion.

Throughout the book there is, commendably, considerable emphasis on the biology and adaptations of the living species, although not at the expense of their previous history. The text is supported by numerous good quality monochrome and colour photographs, maps, diagrams and line drawings. It is a well written, lucid account which at the same time carries considerable authority. The book was originally published in hardback under the title 'Domesticated Animals from Early Times'.

MJD

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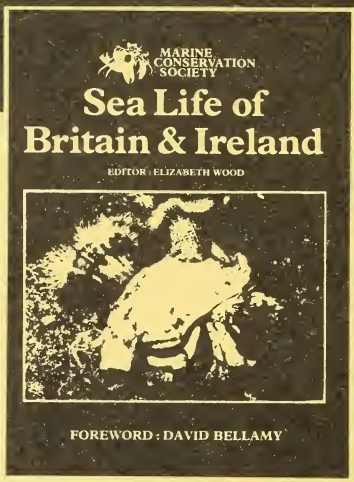

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The Naturalist

A QUARTERLY JOURNAL OF NATURAL HISTORY FOR THE NORTH OF ENGLAND

T. W. Woodhead and the study of vegetation and man in the Huddersfield district — *John Sheail*

Birds from the Mesolithic of Demen's Dale, Derbyshire — *D. Bramwell and D. W. Yalden*

Published by the Yorkshire Naturalists' Union

Editor **M. R. D. Seaward**, MSc, PhD, DSc, FLS, The University, Bradford

Photographic Plates

Readers of *The Naturalist* will have noticed that the number of photographic illustrations has increased in recent years. Good clear photographs, suitably captioned, to accompany articles or as independent features, such as the bird portraits by Arthur Gilpin in the last three issues, are always welcome.

To encourage this development, a long-standing member of the YNU, who wishes to remain anonymous, has most generously offered to make a donation, the income from which would finance the publication of a plate or equivalent illustration in future issues whenever possible. The editor, on behalf of the YNU, wishes to record his deep appreciation of this imaginative gesture.

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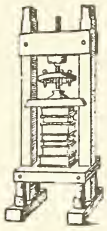

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T. W. WOODHEAD AND THE STUDY OF VEGETATION AND MAN IN THE HUDDERSFIELD DISTRICT

JOHN SHEAIL
NERC Institute of Terrestrial Ecology, Monks Wood Experimental Station, Huntingdon, Cambridgeshire PE17 2LS

The history of ecology has recently attracted much attention. In order to avoid writing 'a traditional treatise on the history of science', authors have generally adopted one of two approaches. In his *Nature's Economy*, Worster (1985) described himself as 'an intellectual historian, curious about the origins of our present ecological ideas, their contents, and their practical effects in the past'. McIntosh (1985) in his *Background of Ecology*, similarly set out to explore the development of concepts and theories. An alternative approach has been to focus on what Soderqvist (1986), in his account of Swedish ecology, called 'the emergence of a social order' and 'the growth of actor networks'. Insights into how these networks of ecologists operated may be gained from the personal recollections of the actors themselves – as in the case of Worthington's *The ecological century* (Worthington 1983), and from the histories of such bodies as the British Ecological Society (Sheail 1987).

Whatever the approach adopted by the historian, a principal effect has been to stimulate fresh appraisals of the pioneers of ecology, and the extent to which their work has been taken up and developed by later ecologists (Cousins 1985). Such a reassessment is particularly pertinent where the contributions of those pioneers have tended to be forgotten, perhaps because their later careers took them into other fields of endeavour. Among the brief obituary notices published in the *Yorkshire Archaeological Journal* in 1940 was one for Dr Thomas William Woodhead. Having identified him as one of the more distinguished members of that 'band of highly individualistic seekers after knowledge' for which the Pennines were famous, the anonymous obituarist recalled how Woodhead's studies of plants had led him to ecology, the relation of things to their environment, and thus to archaeological studies (Anon. 1940). It is upon the career and achievements of T. W. Woodhead that this paper is largely focused.

Early Career

Born in 1863, Thomas William Woodhead came from a family with strong interests in journalism – his uncle, Joseph Woodhead, had founded the *Huddersfield Examiner*. Private tuition and a succession of schools led the young Woodhead to the Mechanics' Institute, where he studied mathematics, chemistry, physics, botany and geology. As a member of the Huddersfield Naturalists' Society, he was able to join the excursions of the Yorkshire Naturalists' Union, widening still further his contacts with the county's leading scientific workers. Through the Botanical Exchange Club, duplicates of plants were received from, and sent to, all parts of the country.

Woodhead secured a position in a local woollen firm, first as a half-timer and then on the office staff. By the late 1880s, he had become a traveller for the company. Letters between himself and the girl he was to marry (a pupil teacher at the Moldgreen Board School) identify the towns visited in the course of a week and the importance he attached to 'rambling' at the weekends. More than once did Annie write, 'If you have no ramble, will you come up this afternoon?' He continued to study a wide range of subjects at what was now the Huddersfield Technical College, becoming (at the age of 28) an evening lecturer. In 1895, the governors of the College offered him the chance to become a full-time lecturer. He accepted, exchanging £120 a year and the certainty of a reasonably successful business career for a mere £50 and 'a very problematic future in biology'. His salary was doubled within a few months.

Woodhead was acutely conscious of his need for further training; natural history pursued as a hobby in the field was one thing, teaching natural-history subjects for

examination purposes quite another. He spent the summer of 1895 in Bonn, studying under the leading plant cytologist, Edvard Strasburger (who was so impressed by Woodhead's laboratory work that he refused to take any fee). During the next three summers, Woodhead studied at the Royal College of Science in London, and, in 1897–8, spent two days a week over a 30-week period attending courses in zoology and botany in the University of Leeds. Louis C. Miall, the Professor of Biology, wrote of his

PLATE
T. W. Woodhead in America, 1926
(reproduced by kind permission of the Tolson Memorial Museum, WS/CO54/5001).

'carefulness and intelligence', and his spirit of independent enquiry. With such testimonials, Woodhead secured the chance to study at Cambridge in 1900, under Sims Woodhead in the School of Pathology, and Marshall Ward in the Botany Laboratory. His investigations into the structure of the root-nodules of *Alnus glutinosa* formed the basis of a paper read to the meeting of the British Association for the Advancement of Science later that summer (Woodhead 1900). Marshall Ward offered him a post in the Botany School, but, without private means, Woodhead 'felt unable to take up the life'.

Instead, Woodhead remained in Huddersfield, where he turned 'one large bay window and half a dozen bottles' into one of the best equipped biology departments in the country. In 1905, he was granted leave of absence for up to three semesters in a foreign

university. His first inclination was to return to Bonn, but on the advice of Marshall Ward he decided instead to develop his growing interest in ecology by spending the time in Zurich, studying principally under Carl Schröter at the Polytechnical School.

In Zurich, he quickly completed the course work prescribed by the university, submitted his thesis, and was awarded the degree of Doctor of Philosophy. There followed a strenuous botanical tour of the Carpathians, Danube Valley and other parts of Hungary, as well as the Alps of Austria and northern Italy, in the company of Schröter, meeting leading botanists and visiting numerous universities and botanic gardens. On his return to England, he set about sharing his insights and experiences, both informally and in a series of review articles and a paper to the British Association (Woodhead 1908).

Vegetation Surveys

Woodhead's interest in ecology may be traced back to the time he spent in Leeds, studying botany under William G. Smith. The concept of vegetation mapping had been pioneered by Smith's brother, Robert, in the course of surveying the Tay and Forth Basins of Scotland. Following Robert's sudden death in 1900, William completed the maps, and summarized the results in a paper read to the meeting of the British Association in 1901 (Smith 1902). As Woodhead (1929) recalled, many years later, the paper came as 'a breath of fresh air', taking botanists out of the laboratory into the field. Together with two of his senior students, Smith now embarked on a survey of Yorkshire, publishing vegetation maps at a scale of half-inch to the mile (1:126,750) for a quarter of the county in 1903 (Smith and Moss 1903; Smith and Rankin 1903).

The vegetation surveys were an obvious way of sustaining the interest of members of natural history societies at a time when 'the registration of new species was pretty well exhausted' (Moss 1900). Smith wrote a guide for those wanting to take part (Smith 1903), but it was soon clear that something more was required. In December 1904, Woodhead became a founder-member of the Committee for the Survey and Study of British Vegetation (later shortened to the British Vegetation Committee). The other persons to attend the inaugural meeting, held in Smith's house, were Smith, Charles E. Moss (who had surveyed with Smith the south-west part of the West Riding) and Arthur G. Tansley, of the Botany Department at University College, London. The aim of the Committee was to promote further surveys, based on as uniform an approach as was desirable and possible (Sheail 1987).

As a result of his earlier studies in plant physiology, Woodhead's inclination was to map vegetation at a much larger scale than had previously been attempted. He was convinced that the key to understanding distribution patterns was a detailed knowledge of the life history of the component species. To achieve that, the individual species had to be closely studied in both the field and laboratory – a task for which he was by now exceptionally well qualified. Thus, whilst he prepared a vegetation map of some 66 square miles of countryside to the south of Huddersfield, its main purpose was to provide a context to surveys of individual woodlands, where the species would be plotted on Ordnance Survey 25 inch (1:2,500) maps.

The Ecology of Woodland Plants

Woodhead's studies of the Huddersfield woodlands were the first of their kind to be attempted in England (Pearsall 1940a and b). He set out his preliminary findings in papers given to the British Association in 1903 and 1904, and was invited to submit a fuller account to the *Journal of the Linnean Society*. Having learnt that the same paper could be submitted as a dissertation in support of his doctorate, he delayed preparing the final draft until he had made full use of the libraries in Zurich.

An early indication of how Woodhead's interests were developing was a lecture given in 1899 on the bilberry (*Vaccinium myrtillus*). He noticed how the species grew best in woodland. Wherever trees were removed, 'plants like the Ling and Heather fought for possession of the ground and often succeeded in driving out the Bilberry'. In a detailed

examination of the species' vegetative structure, Woodhead sought to identify those 'peculiarities' which enabled the plants to cope with their surroundings, or were adaptive to their environment. The extra development of palisade tissues in the moorland forms acted as protection against intensive light. Leaves were provided with absorption glands, which enabled them to use the moisture deposited by mist and dew. The stems were adapted to withstand high winds. The social habit of the plant, due to the formation of rhizomes, enabled it to crowd out weaker rivals and to 'claim all the ground for itself' (Woodhead 1899).

In 1904, Woodhead published two articles on the bluebell (*Scilla non-scripta*) in *The Naturalist*. In text, line drawings and photographs, he analyzed the cellular structure, physiognomy and functional significance of the bulb, seeds and rooting system of the bluebell, noting for example the essential role played by the large media roots of 4 to 5 inches in length in burying the bulb more deeply and firmly in the soil beneath the loose humus in which germination took place. As he remarked, it was an interesting example of response to environment – the elongation of the bulbs and their root development being stimulated according to their position in relation to depth, air and light (Woodhead 1904).

In Birks Wood, some three miles south-east of Huddersfield, Woodhead set out to demonstrate the influence of these various environmental factors on the distribution of species. After several unsuccessful attempts to show the distribution of the various species on a single map, he decided to map the more abundant ones separately. The most common species was bracken (*Pteridium aquilinum*). By exposing pieces of printing-paper to light for periods of 10 seconds at different points in the wood, Woodhead found that bracken was almost entirely absent from those parts where the shade was densest (Figures 1 and 2). The bluebell was most common on loamy soils, covered by 6 inches or more of humus (Figures 3 and 4). The grass vegetation was composed of 2 species – *Holcus mollis* in the moister parts, and *Deschampsia flexuosa* in the drier parts (Figure 5) (Woodhead 1906).

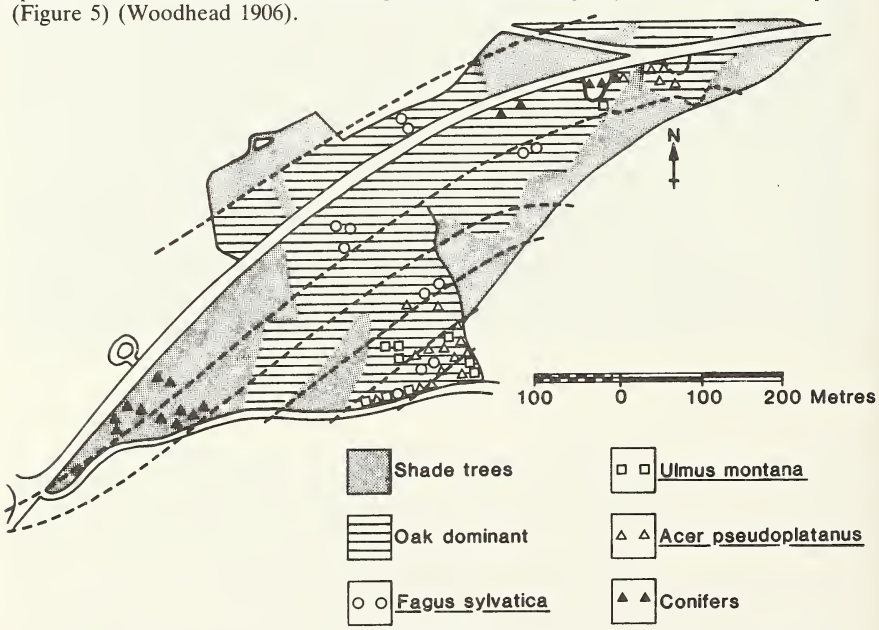

FIGURE 1
Birks Wood: distribution of trees (after Woodhead 1904).

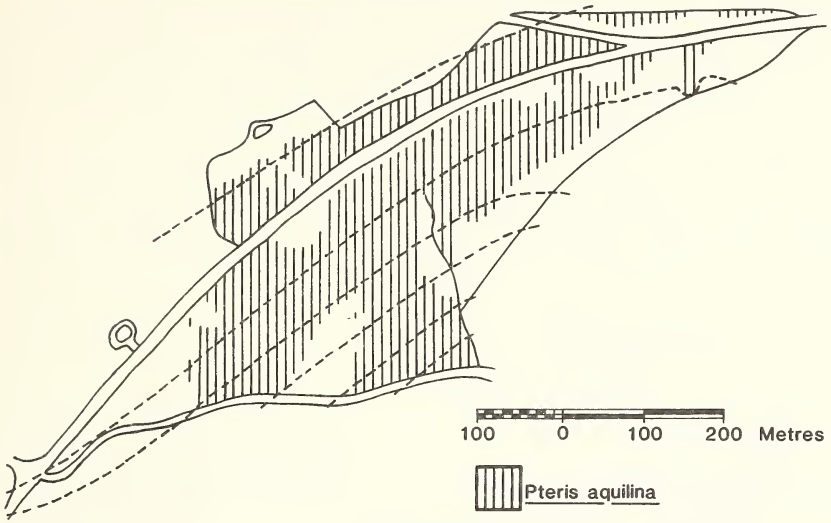

FIGURE 2
Distribution of bracken (after Woodhead 1906).

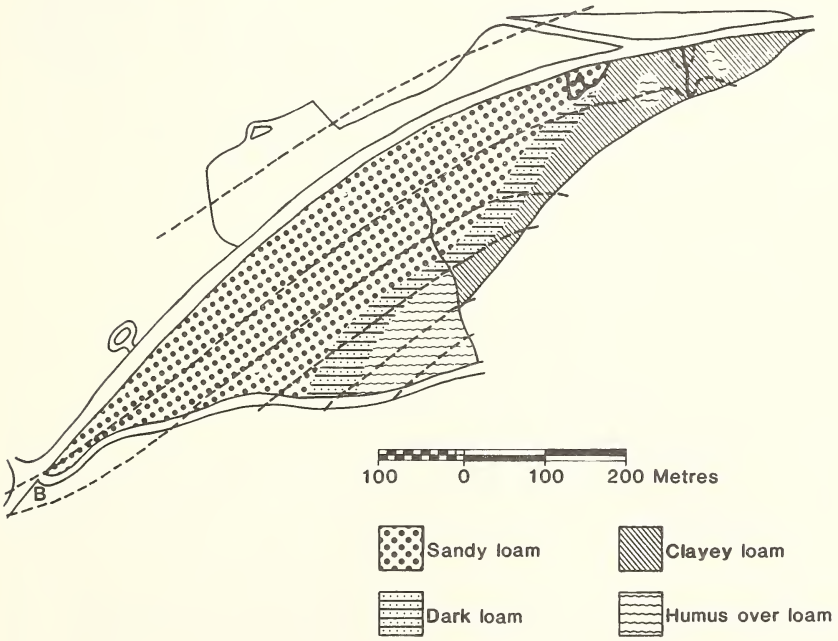

FIGURE 3
Birks Wood: soils (after Woodhead 1904).

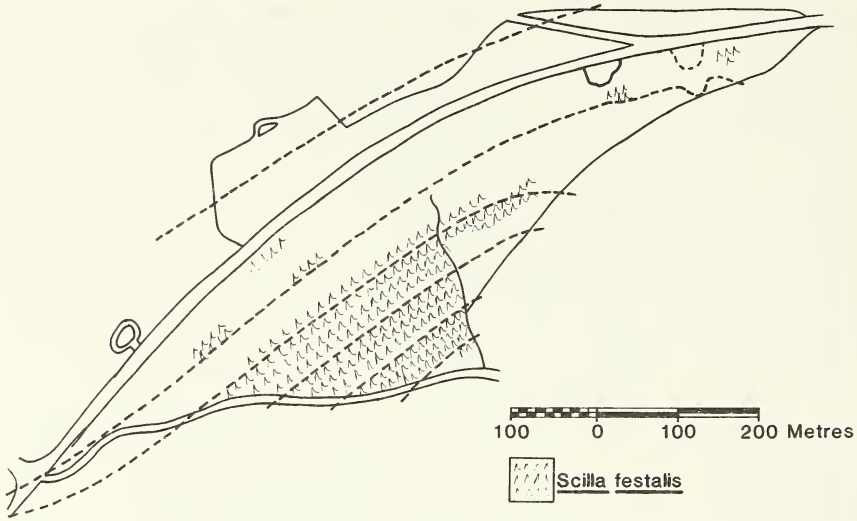

FIGURE 4
Distribution of bluebells (after Woodhead 1904).

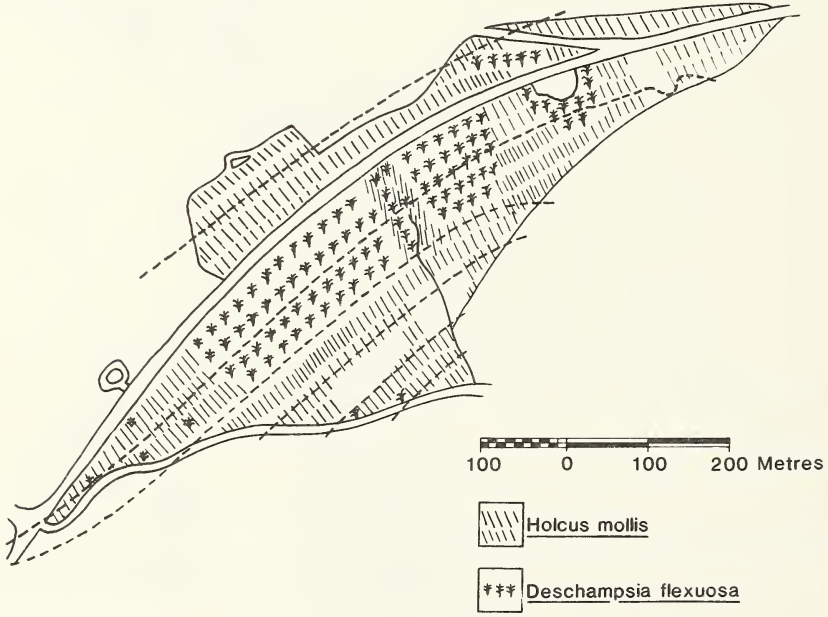

FIGURE 5
Distribution of *Holcus mollis* and *Deschampsia flexuosa* (after Woodhead 1906).

Woodhead characterized two types of relationship between species – the complementary and the competitive association. The fact that bracken, bluebells and *Holcus mollis* were often found in the same parts of the wood could give the mistaken impression that they were in competition with one another. A closer examination revealed that their requirements were so different that each lived in concord with the other – the subaerial parts were edaphically complementary, and the aerial parts seasonally complementary. An examination of the soil profile revealed, for example, that *Holcus* was a surface plant, its long rhizomes running in the loose leaf-mould; the rhizomes of the bracken ran along the upper surface, or just within the loam; the bulbs of the bluebell were found in the firm loam below, although some of the younger bulbs might still be making their way downwards in the *Holcus* and bracken layers (Figure 6). In so far as there

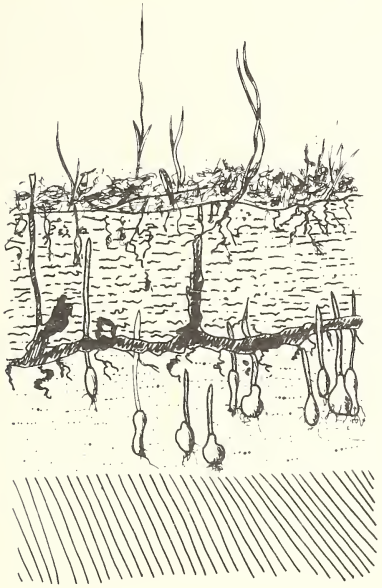

FIGURE 6
Section of soil in dense bluebell area, bulbs deeply buried (after Woodhead 1904).

FIGURE 7
Section of soil where bluebell thins out, bulbs nearer the surface (after Woodhead 1904).

was competition within such a complementary association, it was confined to individuals of the same species. A very different situation prevailed where, for example, the roots were confined, because of soil conditions, to a single layer. In those parts of Birks Wood where there was little or no leaf mould or humus, and the soil was a stiff, sticky clay, the bluebell was virtually eliminated by competition (Figure 7). The few bulbs present were tightly packed between the roots of small trees and other species (Woodhead 1904).

The influence of Woodhead's year in Zurich was most evident in his perception of the extent to which plants, through the adaptation of their structure to different environments, were able to colonize new areas. Schröter was in the course of completing his major work, *Das Pflanzenleben der Alpen* (Schröter 1904–8). Never before had the habits, structure and adaptations of Alpine plant life been described so closely (Woodhead 1908). Whilst Woodhead found it possible to draw a line of demarcation between

the vegetation characteristic of the relatively dry Millstone Grits and the moister Coal Measures in the countryside to the south of Huddersfield, there were instances of xerophytes invading the areas of mesophytes, and of mesophytes encroaching on the xerophytes. Experience in the Huddersfield district bore out the contention that the more plastic a species in terms of changes in moisture, shade, temperature and protection, the wider its range of structural variation and distribution (Woodhead 1906).

A Leading Plant Ecologist

Not only did his sites have an obvious and important place on the itinerary of the first International Phytogeographical Excursion of 1911 (Tansley 1911), but, as a founder-member of the British Vegetation Committee, Woodhead was closely involved in the discussions leading up to the founding of the world's first ecological society, the British Ecological Society, in 1913. One of his own students, T. A. Jefferies, contributed a paper on the ecology of the purple moor grass (*Molinia caerulea*) to the Annual Meeting of the Society in December 1914, a revised version of which appeared in the *Journal of Ecology* in 1915. Based on a detailed study of a tract of moorland near Huddersfield, Jefferies (1915) described how the plant was one of the sturdiest species in the vegetation. This was due to its compact tussock habit, adaptation to rapid transpiration and assimilation, abundant provision for absorption and food storage, and development of woody and strengthening tissues. The most important limiting factor in the species' distribution was the availability of fresh water.

Woodhead's growing confidence as a teacher and scientist was most obviously reflected in the publication of his textbook, *The Study of Plants*. In the preface, he explained how its purpose was to establish the fundamental principles of plant physiology. Considerable emphasis was placed on plant ecology, in the belief that this aspect of plant life gave a more definite purpose to fieldwork and broadened the outlook of students 'by linking up Botany with the study of climate, geology and topography'. So as to avoid 'the weariness of lessons dealing merely with the comparison of forms', the book treated the different types of root, stem and leaf in relation to their functions and the habitat of the plants (Woodhead 1915).

There were many pleasant reminders of his standing as an ecologist during his tour of the United States in 1926, on the occasion of the International Botanical Congress at Ithaca. The Atlantic crossing on board the Cunard liner *Carinthia* was spent (when not playing deck games) discussing, reading and helping to revise papers to be given to the Congress by other botanists on the ship. A paper of particular interest was that by C. H. Ostenfeld of Denmark on the origins of Greenland's flora, which Woodhead found valuable in confirming and clearing his own ideas on the Pennine flora.

Woodhead's journal records how 'a very jolty bumpy journey' in a sleeping car on the Pennsylvania railway brought him to Ithaca, where, at breakfast, he encountered, for the first time, a 'caffetaria' (*sic*) system. The next few days were spent renewing acquaintances made on the continent and during the 1911 Excursion to Huddersfield. There was pleasure in being recognized as the 'discoverer' of 'complementary societies', and as the author of the 'Woodhead text-book'. For Woodhead, the most interesting papers were those on the impact and chronology of glaciation. A long talk with the Swedish plant sociologist, Einar Du Rietz, on arctic and alpine plants made him even more convinced of 'our moorland plants being able to live through the Ice Age on our Nunataks'.

The most enthralling part of the American visit was the post-conference excursion, which took him across the continental divide to the Yellowstone National Park and Grand Canyon. Woodhead's journal is a mixture of factual data provided by the guides, his own brief impressions, and comments on such aspects as the employment of college-trained staff in the Park and the strong community spirit he found in the overnight camps. He was shown over the Botanical Laboratory and seed-testing station at Fort Collins by Frederic Clements, and appreciated greatly the kindnesses shown him by H. L. Shantz, Henry Cowles and, at the Botanical Gardens in New York, Henry A.

Gleason. During the hours he spent crossing Colorado, there was plenty of opportunity to study at first hand the formations of tall, wire and short prairie grass previously known to Woodhead only through the publications of Shantz. The high-point of the return journey was the visit to the lake-sand dunes on the western shores of Lake Michigan, where Cowles had carried out his classic studies on plant succession and the impact of physiographic conditions on vegetation.

No matter how widely he travelled, Woodhead's commitment to Yorkshire remained as strong as ever. He acted as joint editor of *The Naturalist* between 1903 and 1932, and was one of a number of leading figures in the Yorkshire Naturalists' Union to be awarded an honorary M.Sc. degree by the University of Leeds in 1915. His presidential address to the Union in 1922 gave him the opportunity to review the history of botanical survey work, illustrating how, in Yorkshire, botanists had compiled not only longer and more complete lists of species, but had sought to learn more about the complex interactions that governed the origins, behaviour, significance and fate of species. Studies of vegetation development had renewed a long-standing interest in the origins of the British flora (Woodhead 1923).

Not only were the Pennine moors so accessible for teaching purposes, but they provided outstanding insights into what had happened more generally to the British flora. For Woodhead (1923), the key to understanding the impact of the Ice Age was to study the composition and habitats of species populations in the Arctic region at the present day. Of the 300 species common to the Huddersfield moorland, cloughs and deans, 226 occurred in the Arctic circle, and most of the remainder in Siberia. Peat investigations revealed that all the dominant moorland plants could be traced back to the earliest days of the formation. The discovery that those found at the bottom of the profile occupied a larger area at the present day than any other group seemed to Woodhead an independent and significant confirmation of the age-area hypothesis put forward by John C. Willis, who, in numerous recent publications, had described from various parts of the world how the plants which occupied the greatest area in a given country, in a given time, were the oldest in that area (Willis 1922).

In concluding his presidential lecture of the Union, Woodhead (1923) spoke of how the study of ecological problems had brought together the biochemist and physiologist, the histologist, morphologist and systematist, who had for too long worked in isolation. Ecology had forced them to look again at the fundamental problems of the relationships of plants to their environment. If it had done nothing else, ecology had proved and emphasized the inter-dependence of these various branches of botanical study, and had again focused attention on the relevance of geology, topography, meteorology and even anthropology. Always admitted, the inter-relations had been overlooked for too long.

The Origins of the Peat Moors

In a further presidential address, to the British Ecological Society in 1927, Woodhead commented on how workers in every branch of science were becoming more specialist. Ecology was no exception, showing signs of drifting into unintelligible channels, alienating the sympathies of many. It seemed as if the subject might lose its broadening influence and correlating value. A corrective was, however, beginning to emerge. Specialist studies were providing the important links in a chain of evidence that would eventually lead to a much greater understanding of the cyclic changes that occurred in each plant habitat, and the repercussions for the individual units of vegetation. Studies of cyclic change were linking the present with the past, thereby adding further dimensions to the comprehensive outlook of ecology (Woodhead 1929).

Woodhead's own research on the history of vegetation in the southern Pennines highlighted the need to develop links with other disciplines, particularly archaeology and geology. During the excavations of Roman sites near Huddersfield in 1924, a trench was cut across the Roman road at Blackstone Edge. The archaeologist, Ian A. Richmond, found that the paved surface was not only covered by, but was resting on a bed of sandy peat, which Woodhead confirmed to be 22 inches in thickness. Support for the view

that the peat began to form soon after the last Ice Age also came from flint workshops on Marsden Moor, near Huddersfield, excavated from 1918 onwards by Francis Buckley (Buckley 1921), with Woodhead examining the organic remains. Letters between the two men recount how Woodhead would receive boxes of charred wood for identification, and the pleasure there would be when once again the species accorded with those found in association with other flint sites. At the important site of Warcock Hill, there was evidence to suggest not only the pre-Roman origins of the peat, but the presence of trees and ericaceous shrubs in late palaeolithic times (Woodhead 1928a).

Woodhead was among the first British workers to recognize the great potential of pollen analysis, as developed in Scandinavia and widely publicised by Gunnar Erdtman through a series of papers on the post-glacial forests of north-west Europe, as indicated by the statistical differences in the types of pollen grain preserved in the different peat deposits. At Woodhead's instigation, Erdtman visited Warcock Hill during one of his

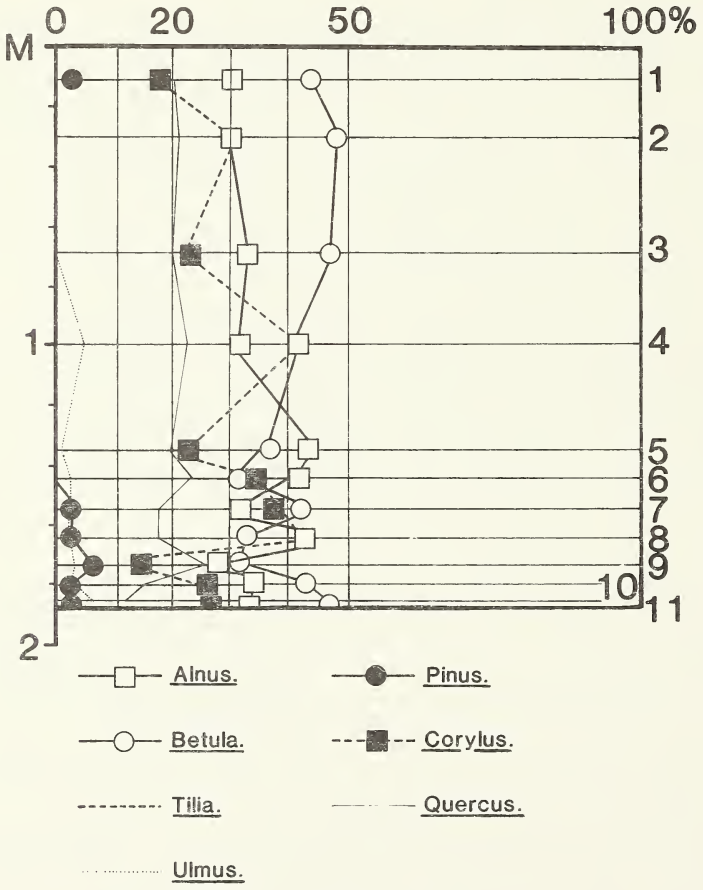

FIGURE 8
Pollen diagram, Warcock Hill, Marsden (after Woodhead and Erdtman 1926).

visits to England. A joint paper, published in *The Naturalist*, included two of the first examples of a pollen diagram based on British data (Figure 8) (Woodhead and Erdtman 1924).

In his presidential address to the British Ecological Society, Woodhead (1929) emphasised the need to avoid reading too much into the diagrams and percentages derived, since some species might produce more pollen than others, and there might be striking differences in the extent to which pollen survived in the peat. Nevertheless, the high percentages of alder and oak, and the presence of lime pollen, especially when taken in relation to the remains found by Buckley, seemed to indicate that the Pennine forests reached their climax at the end of the Boreal or in early Atlantic times, and that, thereafter, in a climate similar to that of today, the peat deposits of the southern Pennines began to form (Godwin 1981).

The Tolson Memorial Museum

For Woodhead, ecological studies led logically to a study of man himself and his industries. The classes he had organized for teachers since 1900 in geography and natural history had made him particularly aware of the value of local studies as an educational aid. Recalling T. H. Huxley's remarks on the value of a study of the Thames basin in the teaching of physiography, Woodhead emphasized that to know Huddersfield was to know the world. It was, however, through his involvement in the founding of the Tolson Memorial Museum at Ravensknowle, on the outskirts of Huddersfield, that Woodhead's perception of man's relations to his surroundings found its fullest and most tangible expression (Pearsall 1940b).

In 1919, the owner of Ravensknowle Park, Legh Tolson, offered the property of two houses and six acres of gardens and parkland to the Huddersfield Borough Council as a memorial to his two nephews, killed in the Great War. Having already sought Woodhead's views, Tolson stipulated that the buildings should be converted into a museum for demonstrating 'the influence of all conditions existing in the neighbourhood upon the plant, animal and human life of the town and district'. It was to Woodhead that Tolson and the Borough turned for more detailed guidance. As Woodhead remarked, in a paper read at the Town Hall in August 1919, the gift was an opportunity which many towns would envy, namely the chance to create a museum from scratch.

Only a national museum, with national resources, could hope to build up 'an accumulation of universal objects' with any degree of success. Based on local, intensive surveys of plant and animal, as well as human, communities, Woodhead believed the aim of a local museum should be to present practical illustrations of the main factors in the environment. By focusing on local aims and objects, providing ample scope for the most skilful hands and able minds in the presentation of information, the museum would help to cultivate local patriotism of the most desirable kind. In the course of time, the museum would provide an outstanding illustration of how 'the better a man understands the conditions under which he lives, the better he will be able to bring his own activities into harmony with them' (Woodhead 1919 and 1923).

The specific aims of the museum should be to illustrate the origin, structure, physical features, natural history and the conditions of life in the district. The history of its inhabitants and their activities would be set out in relation to local conditions and the world outside. Woodhead used a diagram to illustrate the inter-relationship of the main factors of man's environment, and to bring out the extensive ramifications and importance of these factors when studied in their local context (Figure 9).

Any set of displays would begin with the habitat of living organisms, namely the geology, topography, climate and soils. Attention would then turn to the individual organisms themselves, the communities of which they formed part, and the bearing of such factors as invasion, succession and stabilization on their well-being. In Woodhead's view, the main object of the natural history section would be to emphasize that local plants and animals were not merely collections of species to be technically named and classified, but that they belonged to, and characterized, a special set of environmental

conditions, to which they showed an endless number of beautiful and suggestive adaptations.

The Huddersfield district provided many important examples of the life of human communities, their patterns of movement and distribution (as recorded by place-name and other evidence), and types of inter-communication, expressed in the form of art and literature, and in language and music. A museum should scotch the notion that there was no local history to be found in a modern industrial district, such as Huddersfield. Of the 147 examples of sculptured and inscribed stones of the Anglo-Scandinavian period found at 42 sites in the West Riding, about a third occurred at 11 sites in the immediate neighbourhood of Huddersfield, which itself contained a Roman fort and the largest and best-preserved pre-Roman earthwork in Yorkshire.

Woodhead was appointed honorary director of the Museum, and played the key role in selecting and arranging material, emphasizing the needs of the teacher and student, as well as those of the public. Experience indicated that too often a school visit consisted

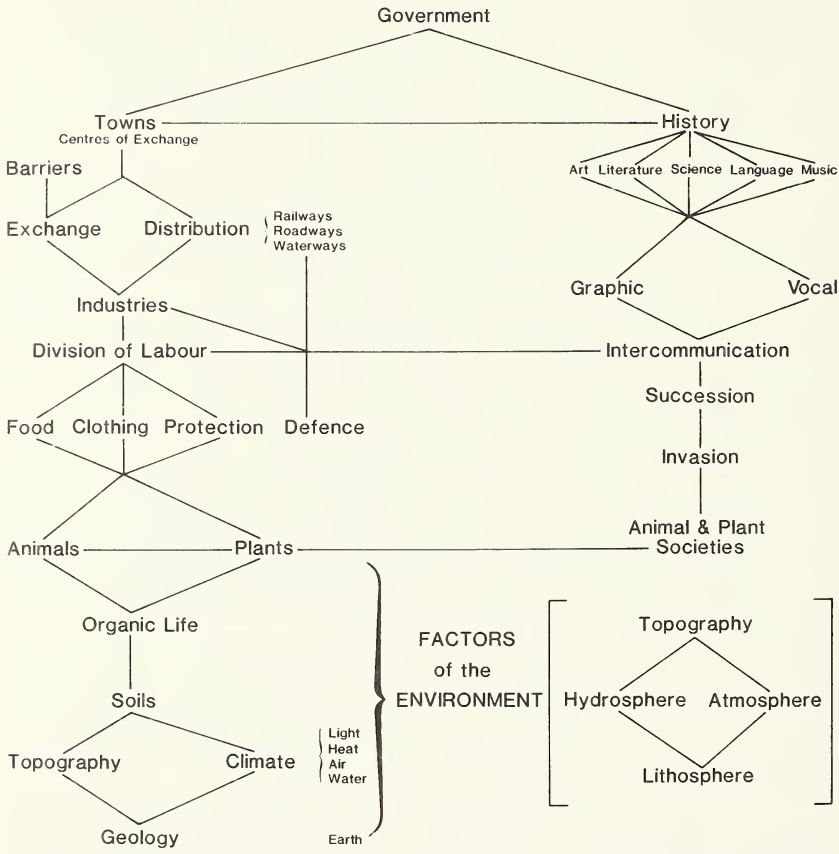

FIGURE 9

Suggested scheme for the development of a local museum based on the study of the inter-relations of the main factors of Man's environment (after Woodhead 1919).

of a walk through the rooms and a hurried glance at a multitude of objects. There was need for teachers to concentrate on a particular object or group of related objects. A room was set aside in the Museum for study and class work, with specimens brought from their cases for demonstration purposes. Many specimens were placed on permanent loan in local schools. Particular importance was attached to the publication of a series of illustrated booklets (Woodhead 1928b).

Woodhead's approach was amply demonstrated in a paper he gave to the International Botanical Congress at Cambridge in 1930, based on fourteen relief models, representing an area of 280 square miles around Huddersfield and each forming the centrepiece of an exhibit in the Museum. The first illustrated the main factors determining the character and distribution of plant associations, namely the solid geology, topography, rainfall and river basins. There followed models depicting the vegetation of the Late Ice Age, Boreal, Atlantic and Romano-British times, and as recorded in the Domesday Survey and at the turn of the present century. The series was completed by models showing the spread of early settlement and population distribution at the present day. Taken together, the series highlighted the degree to which changes in climate had played an important part in determining the pattern of vegetation, which had in turn been affected by the successional changes brought about by the impact of new plant associations on their habitat. Notwithstanding the effects of man on the natural vegetation, there was plenty of evidence to suggest that Nature too had exerted a powerful influence, limiting the extent of human endeavour in so many ways (Woodhead 1931a and b).

Woodhead's last major publication, and the tenth in the Museum's series, grew directly out of his membership, as a borough councillor, of the Waterworks Committee. In recounting the origins and development of the Huddersfield water supply, he became even more conscious of how each catchment area was more than a physiographical entity – it embraced all the subjects with which ecology and development were concerned. Failing health prevented his dealing more closely, as he had hoped, with the biological and scientific problems of the Pennine waters (Woodhead 1939).

A measure of the Museum's success was the addition of a new wing in 1936, and the acquisition of many local collections, such as the Porritt collection of Lepidoptera. In a survey carried out on behalf of the Carnegie Trustees in 1927, the president of the Museums Association, Sir Henry Miers, described the Tolson Memorial Museum 'as the best example of a really local museum . . . a remarkable example of one man possessed by a dominating idea'. In describing the Museum as the best memorial to Woodhead's work, Pearsall (1940b) expressed the hope, in his obituary notice in the *Journal of the Linnean Society*, that resources would be found to maintain and develop the venture in the difficult post-war years ahead.

Dr Woodhead

The man known to everyone in Huddersfield and beyond as Dr Woodhead died in his 77th year in March 1940. Despite the many advances in methods, his intensive studies of the Huddersfield woodlands remained a model of how fieldwork should be planned and executed. The influence of Woodhead, together with those other pioneer ecologists in Yorkshire, William Smith and Charles Moss, was considerable. Whereas, in the great continental areas of the world, such as those studied by the American ecologists of the Mid-West, the main group of factors controlling the distribution of vegetation types seemed to be climatic, research in Yorkshire, with its history of recent disturbance and extensive tracts of new soils, caused British ecologists to place greater emphasis on edaphic factors (Pearsall 1938).

For Woodhead, ecology was less a subject than a general method of approach. A consuming interest in the life history of a plant species widened to include that of the community, and eventually the life history of the region in all its different human aspects. A leading exponent of regional survey, his ever-broadening outlook was exemplified in the creation of the Museum, wholly organized to show the inter-relationship between geology, soils, vegetation and animals, and man himself (Pearsall

1940a and b). One of the most approachable of men, he spared no effort in giving advice and encouragement. Godwin (1981) recalled many years later how his own interest in acid mires was 'encouraged by a visit to the Cambridge Botany Club of the wise and homely figure of Dr T. W. Woodhead'. It may be, within the careers of this younger generation of life scientists, geologists and archaeologists, that the answer may be found to the question why the kind of holistic approach, which Woodhead brought to the study of Huddersfield, was so rarely emulated elsewhere.

In his tributes to Woodhead, W. H. Pearsall commented on how the remarkable Museum at Huddersfield was less generally known than it deserved to be. The same might be said of Woodhead himself among historians of the environmental sciences. The main strength of those sciences may have resided in London and the various university towns, but the publications and personal papers of Woodhead are a salutary reminder of the intellectual vigour that was to be found in Huddersfield and perhaps other industrial centres at the turn of the century. Whilst he may have been exceptional in attaining such academic distinction, and yet remaining within the community from which he sprang, Woodhead may also have been representative of many others in remaining 'an expert in his own ignorance'. Such humility may be the hallmark of scholarship, but it is not the most effective way of attracting the attention of contemporaries or, for that matter, the historian.

Note

Unless otherwise stated, the paper is based on the personal papers of Dr T. W. Woodhead, preserved in the Tolson Memorial Museum, Huddersfield. I am grateful to the Senior Curator, for permission to consult the archive, and to Mr J. A. Gilks for his guidance and encouragement.

The *Huddersfield Examiner* published tributes to Woodhead at the time of his retirement (19 May 1928), and on his death (6 and 9 March 1940 and 4 May 1940).

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BOOK REVIEWS

Eric Hosking's Birds of Prey of the World. Photographs by **Eric** and **David Hosking**, text by **Jim Flegg**. 176 pp, 200+ colour and b/w photographs. Pelham Books. £15.95.

Published as a medium to portray further 'Hosking' photographs, most people will flick through the plates many times before turning to read the main text. As expected from this publisher, most of the plates are of a very high standard, although up to 25% may have been taken in captivity, which, although acknowledged in the Preface, is disappointing, since many are uninspired. (Notable exceptions are the Lanner Falcon in high-speed pursuit (p. 16–17) and displaying crowned Hawk Eagle (p. 28–29). In comparison, some of the other 'in habitat' away from the nest shots, such as those of the Bald Eagle soaring over Alaskan mountains (p. 66) and Marabou Storks with Rupell's and White Backed Vultures at a carcase (p. 116–117) supplement better known classics, such as the Marsh Harrier at the nest (p. 66). Jim Flegg's text is accurate and easy to read, but necessarily brief in order to cover all major raptorial families, over 100 species being illustrated.

Not an aid to identification, nor a detailed group monograph, but another display of

fine photographs, suitable, perhaps, as a good-value present to an 'interested friend' and a tribute to many years' fieldwork.

IPFO

A Study of Blackbirds by **D. W. Snow**. Pp. 196, with b/w drawings by Robert Gillmor. British Museum (Natural History), London. 1988. £7.95 paperback.

The blackbird has been one of the most successful species to take advantage of the urban and suburban environment created by man. This book studies a population of blackbirds living in the Botanic Gardens in Oxford. Covering an area of some six acres, part with lawns and flowerbeds, part less formal with rough grass, thick bushes and a small pond, the whole is well planted with trees and shrubs. During the four years of the study, an average of thirteen pairs nested in the gardens, each bird recognisable as an individual by the use of colour rings.

The author does not claim to have written a definitive monograph about the blackbird, but has 'deliberately concentrated on aspects of the blackbird's life that have interested me'. Thus, after chapters on plumages and moults, food and feeding habits, there are twelve chapters dealing with the progressive stages of the breeding cycle. Three final chapters refer to the Botanic Garden population, Other populations and Blackbirds elsewhere. It is an example of how much can be discovered by a careful study of the commonplace.

The study, which began in 1953, was first published in 1958; it has been re-published unchanged but with the addition of a 3-page postscript drawing the reader's attention to more recent published research. With the increase in the number of birdwatchers, the reprinting of this book will be welcomed by many unable to obtain a copy of the original edition. It is also a reflection of the changing times that the original book was published in hard-back for £1.05 while the reprint, just 30 years later, is in soft-back and costs 9½ times as much.

AJW

Grasshoppers and Allied Insects of Great Britain and Ireland by **Judith A. Marshall** and **E. C. M. Haes**. Pp. 252, with 55 text figures, 59 maps and 12 colour plates. Harley Books, Colchester. 1988. £25.

In this extraordinarily comprehensive work, the authors have surely fulfilled the publisher's wish, expressed in David R. Ragge's foreword, that this will prove to be the standard book on British Orthopteroid insects for years to come. The quality of the beautiful colour plates of the insects themselves, painted by Denys Ovenden, one of our leading entomological artists, is matched by the scholarly text; the authors seem to have left no stone unturned. The introduction deals not only with orthopteroid morphology, taxonomy and metamorphoses but also includes sections on ecology, rearing, predators, parasites and diseases, photography (by R. & C. Foord), sound recording (by J. F. Burton) and the necessity of conservation. Hints for collecting are provided, though this is not encouraged and indeed it is prohibited in the case of the Wart-biter (*Decticus verrucivorus*), although, as the authors point out, whilst the insect is legally protected its habitat is not!

The main body of the work deals with the 52 British species, following a rigid treatment under description of species, life history and behaviour, habitat, status and distribution for each species in turn. A distribution map accompanies each species discussed but more detailed maps are also given in the Appendices, which also include lists of notable British localities for these insects. A novel innovation in a British entomological book is the inclusion of a list of colloquial Welsh, 'Scottish' (i.e. Gaelic) and 'Irish' (i.e. Erse) names for the more familiar species. The book also includes an exhaustive list of References. This addition to Harley's superlative series is an essential for any individual or institution concerned with British wildlife.

PS

BIRDS FROM THE MESOLITHIC OF DEMEN'S DALE, DERBYSHIRE

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Introduction

A small fissure in the Carboniferous Limestone at Demen's Dale, Taddington, Derbyshire (Nat. Grid Ref. SK169703) was excavated in 1947–50 by Major T. A. Harris. A brief mention of the excavation appeared in *The Archaeological Newsletter* of November 1948 (No. 7, p. 6), but no account was ever published. He reported (verbally to D.B.) that he had found Mesolithic implements of black chert and, rarely, flint; all his surviving archaeological material was passed to Sheffield City Museum, and these items may be among it, but Dr R. Jacobi, who has been reviewing Mesolithic material from Britain informs us (*in litt.* 24 March 1987) that he has not seen any from this site. Ms P. Beswick, Keeper of Human History at Sheffield City Museum, considers that surviving worked chert and flint from Demen's Dale is Neolithic/Bronze Age in character (*in litt.* 4 June 1987). A small collection of bird bones was passed to D.B. for identification, and he was personally involved in the latest stages of the excavation. The bird bones, and a few small mammal specimens, remained in his possesion until 1987, and a preliminary list of identifications appeared in Frost, 1978 (as Appendix 3, p. 162). Each of us, working independently, has re-examined the material for this paper, as has Dr C. J. O. Harrison; the material will shortly be deposited in the Sheffield City Museum, Weston Park, Sheffield S10 2TP.

Site and Context

Demen's Dale is a narrow limestone gorge situated on the south-east side of a glade where Taddington Dale and Deep Dale, both dry valleys, run into Monsal Dale, the valley of the R. Wye. The steep dale sides here are clothed in deciduous woodland, mostly Ash *(Fraxinus excelsior)*, with some scrub of Hawthorn *(Crataegus* sp.) and Hazel *(Corylus avellana)*. The broader valley floor at this point is rough, grazed, grassland, and there is, even now, a small fish pond. The limestone plateau above is grassland at 300 m, about 150 m above the valley floor.

A field sketch of the section at Demen's Dale, made by D.B. on 6 May 1949, suggests that 8 layers, A–H, could be recognized (Fig. 1). Layers A–E, covering Romano-British, Bronze Age and Neolithic deposits, had been excavated by Major Harris before D.B. visited the site. The birds and small mammals were obtained from rubble layers F and G, which contained pigmy flakes of Mesolithic age. The underlying greyish gravel, layer H, containing Aurignacian tranchets, and the overlying dry red soil, layer E, containing Neolithic artifacts, seem to confirm the dating of the fauna.

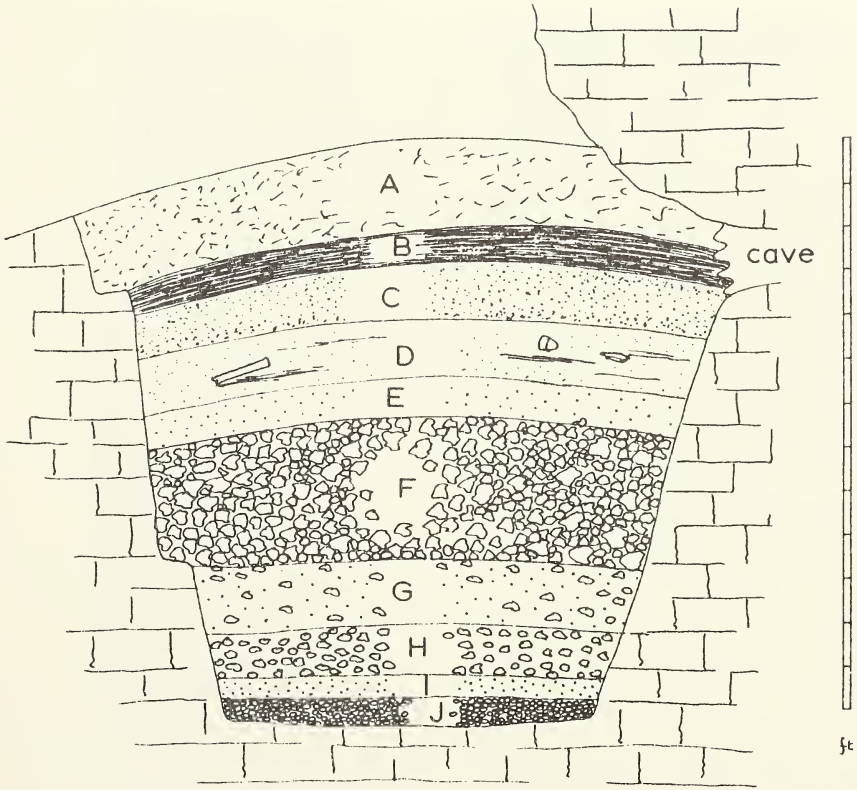
Avifauna

Anseriformes

Mallard *Anas platyrhynchos*

A broken metacarpal, which matches ♀ Mallard in size; it also matches ♀ Goosander, and most diagnostic parts are missing, but the distal bridge between the shafts of mc 2 and mc 3 are deeper in *Anas*.

A complete metacarpal, 61.5 mm long, originally labelled '?goosander' (D.B.) certainly matches the size given by Woelfle (1967) for ♂ Goosander, and is apparently too small for Eider. Nevertheless, a reference ♀ Eider, 60.6 mm long, is a better match on both size and morphology, and D.W.Y. so identified it. However, C.J.O.H. points out that morphologically it is in fact a Mallard bone, and on re-checking we agree with him. Its large size suggested to him that it could even be of domesticated stock, but the preservation of the bone does not suggest it to be a later, intrusive element, and wild drakes undoubtedly attain this size (cf. Woelfle, 1967).



A	Recent	Disturbed
B	Romano-British	Black layer; ash, bone fragments, pot
C	Intermediate	Stiff brown clay; Red Deer bone points
D	Bronze Age	Dry brown clay; potsherds, food bones, occasional hearth
E	Neolithic	Dry reddish cave earth; flint semi-circular knife
F	Mesolithic	Scree of large and small stones; some rodent bones
G	Mesolithic	Soil and stones; bones of birds and rodents
H	U. Palaeolithic	Loose stone; Aurignacian tranchets
I		Red earth
J		Fine stream-washed gravel

FIGURE 1
Diagrammatic Section of Demen's Dale Rock Shelter. Based on field sketches made by D. Bramwell, 1948–1950.

cf. Teal *A. crecca* and Garganey *A. querquedula*.

Two left metacarpals, 38.1 mm and 36.9 mm long; these are within the size range for both ♂ and ♀ Teal, but also within that of ♀ Garganey, (Woelfle, 1967). The smaller seems to be Teal, but the larger one, and a distal half of a tibiotarsus seem to be Garganey (C.J.O.H.).

cf. Gadwall *A. strepera* and Wigeon *A. penelope*.

Two left tarsometatarsals, one nearly complete 39.4 mm long and the distal half of the other, were originally determined (D.B.) as '?Gadwall' and '?Wigeon' respectively. On size, they could be either, though *A. strepera* averages larger than *A. penelope*. However, the distal trochea IV is much broader in *A. strepera*, but extends less far up the shaft, than in the more complete specimen; it is more likely to be *A. penelope*. The distal end of a humerus, distal end of a tibiotarsus and the broken tarsometatarsus all seem slightly too small for *A. strepera*, and are probably *A. penelope*. The proximal end of a humerus, 18.6 mm wide, could be *A. strepera*, *A. penelope*, or *A. acuta*, on size; C.J.O.H. prefers, on morphology and size, *A. strepera*.

Shoveler *A. clypeata*

A broken left metacarpal, 48.5 mm long, could, on size, belong to *A. strepera*, *A. penelope* or *A. clypeata*; C.J.O.H. reports that, on morphology, it matches the latter.

Pintail *A. acuta*

The distal end of a tibiotarsus, noticeably larger than the example referred to *A. penelope*, was identified by C.J.O.H. as Pochard, *Aythya ferina*. On morphology, however, it is an *Anas*, and matches well in size and shape a ♀ *A. acuta*.

Goldeneye *Bucephala clangula*

Two complete metatarsals, 36.1 and 37.1 mm long (provisionally identified as '?Tufted Duck' – D.B.) are within the size range of several ducks, but have the stout shaft and strong anterior ridge of *Aythya* rather than *Anas*. Woelfle (1967) gives the ranges of Pochard *A. ferina* 37.3–40.1, Tufted Duck *A. fuligula* 32.0–37.0 and Goldeneye 33.3–39.9, so that on size the specimens could be any of these. However, the form of the tendon ridges and grooves on the posterior surface of the proximal end matches *Bucephala* very clearly.

Goosander *Mergus merganser*

An almost complete right femur, 49.6 mm long from head to entepicondyle, matches a reference ♂ Goosander (51.0 mm), but is larger than either ♂ Merganser *(M. serrator)* or ♀ Goosander reference skeletons (45.2–46.3 mm) (and also smaller than ♀ Eider at 55.0–60.3 mm).

Falconiformes

Kestrel *Falco tinnunculus*

The distal half of a tarsometatarsal matches our reference material.

Galliformes

cf. Ptarmigan *Lagopus mutus*

A pair of ulnae, 55.8 long, and with shafts 3.1 mm wide, and a carpometacarpal 33.1 mm long, are actually smaller than a reference skeleton. However, Kraft (1972) shows that there is almost complete overlap in length of these bones between *L. mutus* and Red Grouse *L. lagopus*. The more slender shafts of the ulnae, and their smaller size, strongly suggest that these are *L. mutus*, in particular by comparison with the scattergram, Fig. 24, in Kraft (1972).

cf. Black Grouse *Lyrurus tetrix*

The proximal end of a tibia seems slightly too broad for *Lagopus* sp., but falls within the range of Greyhen (cf. Ebersdobler, 1968). However, ♂ *L. lagopus* and ♀ *Lyrurus*

tetrix overlap in size, and C.J.O.H. considered this bone was better matched by *L. lagopus*. He may be right, but we prefer *L. tetrix* on size and morphology.

Grey Partridge *Perdix perdix*

Two distal halves of humeri; five tarsometatarsals, including two complete ones 42.5 mm and 41.4 mm long; and a distal half tibiotarsus. The humeri are much too small for Ptarmigan, while the tarsometatarsals are too long for that. The tibiotarsus is the same size in these two species, but morphologically this example, and the tarsometatarsals, are clearly Partridge (see Kraft, 1972).

[Ralliformes

Distal ends of two tibiotarsi, referred in Frost (1978) to Moorhen *Gallinula chloropus* and Coot *Fulica atra,* are now identified as ducks, *Anas* sp; while a broken metacarpal tentatively identified as Corncrake *Crex crex,* is charadriiform, perhaps Snipe.]

Charadriiformes

cf. Grey Plover *Pluvialis squatarola*

A distal 80% of a tarso-metatarsal and a distal 70% of a tibiotarsus match reference specimens of Golden Plover *P. apricaria* well for size and morphology, except that the tibiotarsus shaft is too long. A carpometacarpal 33.7 mm long is somewhat larger than reference specimens of Golden Plover (at 30.3 and 30.9 mm). C.J.O.H. confirms that the carpometacarpus and tarsometatarsus match Grey Plover *P. squatarola*, but he suggests that the tibiotarsus shaft belongs to Lapwing *Vanellus vanellus*. Re-checking, we feel that the curvature and thickness are wrong, and we prefer, conservatively, to assign that also to Grey Plover (of which, however, we have no reference specimen).

Snipe *Gallinago gallinago*

A carpometacarpus 27.5 mm long, formerly identified as perhaps Corncrake, *Crex crex*, is now referred here. It is rather small for Knot or Redshank and much too small to be a Ruff, while it is too long to belong to one of the sandpipers, but it seems to match Reeve quite well on size. However, as pointed out by C.J.O.H., the very broad proximal base of metacarpal III, and the proximal slope of the metacarpal I process, match Snipe but rule out Reeve and other waders, though it is somewhat larger than three reference specimens of Snipe.

Dunlin *Calidris alpina*

The proximal 40% of a right humerus is intermediate in size between two reference *C. a. schinzii,* and smaller than a *C. a. alpina* (this was identified tentatively as ? Green Sandpiper by D.B. in Frost, 1978).

cf. Knot *C. canuta* and Reeve, ♀ *Philomachus pugnax.*

The proximal 60% of a right humerus and the distal 70% of a tibio-tarsus belong, on size, to 150 g waders such as Knot, Reeve, or Redshank *Tringa totanus*. The base of the cnemial crest on the tibia indicates that the tibia would have been too short for Redshank or Reeve, so is probably Knot. Conversely, the shaft of the humerus is perhaps too long for Knot and is probably Reeve. These identifications are confirmed by C.J.O.H. (These were provisionally determined as Turnstone, *Arenaria interpres* but published measurements, in the absence of a reference specimen, suggest that that would be too small.)

Strigiformes

Eagle Owl *Bubo bubo*

An almost complete tarsometatarsal, with the central trochlea III missing, but 76.5 mm

long as preserved and 11.9 mm wide at mid shaft is clearly of this species, being much too large for Snowy Owl *Nyctea scandiaca*. The late A. Hazelwood, Bolton Museum, originally identified this specimen.

Tawny Owl *Strix aluco*

An almost complete left tarsometatarsal and the shaft of a right tarsometatarsal match reference material well morphologically, but the more complete bone is about 1 mm longer than the largest of 6 reference examples (45.0–47.8 mm). However, the range of measurements given by Langer (1980), 45.5–50.1 mm (n = 25), shows that this is within the size range of this species; there is no real reason to assign it to the larger, European, *S. uralensis* or *S. nebulosa* in which the tarsus averages larger by about 5 mm and 7 mm respectively (Cramp & Simmons, 1985) though with some overlap.

Passeriformes

Missel Thrush *Turdus viscivorus*

A left carpometacarpus 24.4 mm long is clearly of this species, and much too large for Fieldfare *T. pilaris* or Blackbird *T. merula.*

cf. Blackbird *T. merula*

The distal 70% of a tibiotarsus, which we had tentatively referred to *T. viscivorus* is, as C.J.O.H. points out, too slender and too short (the base of the fibular crest indicates its length). He suggests either *T. merula* or Ring Ouzel *T. torquatus*, but both *T. torquatus* and Fieldfare *T. pilaris* (all three species being very close on overall size) are somewhat longer-legged than *T. merula*; this specimen matches *T. merula* specimens more closely.

Hawfinch *Coccothraustes coccothraustes*

A nearly complete mandible, 28.2 mm long and 9.4 mm high at the coronoid, is unmistakeable.

Jay *Garrulus glandarius*

The proximal half of a tarsometatarsal is intermediate in size between two reference specimens.

Discussion

Identification of bird bones is difficult, and depends in part on adequate reference collections (cf. Harrison, 1980a). Even then, in the more diverse orders or families (e.g. Anatidae, Scolopacidae), identifications cannot always be certain, and there is the further problem that species not known to occur now in Britain may have been present in the past. As an example, we could not be certain that the Jay we have identified was not a Nutcracker *Nucifraga caryocatactes,* for which we have no reference material (but C.J.O.H. has checked this for us – it is a Jay). Other identifications are more definite; among these, the Eagle Owl is the most interesting, as it has not often been reported from Britain. Harrison (1979, 1980b) has reported it from much earlier in the Pleistocene, from the Cromer Forest Beds and the Wolstonian of Tornewton Cave, Devon. Probable Late or Post-Glacial occurrences are those at Chelm's Combe Rock Shelter, Cheddar, (Balch, 1926) and Langwith Cave, Derbyshire (Mullins, 1913), though dating of these is uncertain. There is a currently unpublished record from the Late Glacial of Ossom's Cave, Manifold Valley, Staffordshire (G. Cowles, pers. comm.). The present record seems to be the most recent example, though we would wish that the dating was more certain and confirmable from extant artefacts. The small mammal material, however, does offer some confirmation of a Mesolithic dating. There were no lemmings, *Lemmus lemmus* or *Dicrostonyx torquatus,* which supports a Post-Glacial date, but there were both *Microtus agrestis* and *M. oeconomus*. The latter, now extinct in Britain, is believed to have persisted into the Mesolithic. The identification of Ptarmigan, if correct, also suggests an early i.e. Mesolithic, post-glacial date. The northern, tundra-breeding,

waders (Knot and Grey Plover) could also hint at an early date, but since they winter on British coasts, and very occasionally pass through Derbyshire on passage even nowadays (Frost, 1978; Lack, 1986), they do not provide convincing evidence for any particular habitat or climate.

The fauna is an oddly mixed one (Table 1); there are a large number of aquatic species for an inland site (the ducks and waders), open-ground species (Partridge and Ptarmigan, perhaps Kestrel and Missel Thrush) and woodland species (Tawny Owl, Jay, Hawfinch). These could indicate that the fauna accumulated over a long period of time, during which the habitat changed from open to wooded (as we know happened in about 2,000 years from 10,000 to 8,000 B.P.), though it could indicate diverse contemporary habitats, analogous to present conditions, with open ground on the plateau and woodland in the valley. The suite of aquatic species would require more water than is now present, but the valley bottom is wide enough to support a small lake, and the discovery of the incisor of Beaver *Castor fiber* in the Neolithic layers of a nearby archaeological site (D.B., unpubl.) suggests how such a lake could have been formed.

TABLE 1
Summary list of the birds of Demen's Dale

Anseriformes	
Mallard *Anas platyrhynchos*	Freshwater
Teal *A. crecca*	Freshwater
Garganey *A. querquedula*	Freshwater
cf. Gadwall *A. strepera*	Freshwater
cf. Wigeon *A. penelope*	Freshwater
cf. Shoveller *A. clypeata*	Freshwater
Pintail *A. acuta*	Freshwater
Goldeneye *Bucephala clangula*	Freshwater
Goosander *Mergus merganser*	Freshwater
Falconiformes	
Kestrel *Falco tinnunculus*	Grassland with trees/cliffs
Galliformes	
cf. Ptarmigan *Lagopus mutus*	Moorland
cf. Black Grouse *Lyrurus tetrix*	Moorland-Scrub
Grey Partridge *Perdix perdix*	Grassland
Charadriiformes	
cf. Grey Plover *Pluvialis squatarola*	Moorland-Marine
Common Snipe *Gallinago gallinago*	Moorland-Freshwater
Dunlin *Calidris alpina*	Moorland-Freshwater-Marine
cf. Knot *Calidris canuta*	Moorland-Marine
cf. Reeve *Philomachus pugnax*	Grassland-Freshwater
Strigiformes	
Eagle Owl *Bubo bubo*	Woodland-Grassland
Tawny Owl *Strix aluco*	Woodland
Passeriformes	
Missel Thrush *Turdus viscivorus*	Grassland with trees
cf. Blackbird *T. merula*	Woodland
Hawfinch *Coccothraustes coccothraustes*	Woodland
Jay *Garrulus glandarius*	Woodland

Acknowledgements

We thank Dr R. Jacobi and Ms P. Beswick for discussing the archaeological context of these finds, the late A. Hazelwood for originally recognizing the Eagle Owl, and most particularly, Dr C. J. O. Harrison for meticulously checking the whole collection. We also gratefully acknowledge the many people who have supplied our reference skeleton collection over the years, especially the Wildfowl Trust at Martin Mere.

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ENTOMOLOGICAL REPORTS FOR 1986-1987
COLEOPTERA: STAPHYLINIDAE (ALEOCHARINAE)

M. L. DENTON

It had been hoped that the last Aleocharinae report *(Naturalist* **111:** 91-96) would stimulate a growing interest in the sub-family and that the outcome would be a greater understanding of the distribution of this under recorded group, but it was not to be. In fact the number of collectors contributing records actally fell, and even the volume of specimens sent for identification by Mr D. Maude of Huddersfield waned; his collecting in the past having added considerably to our knowledge of Yorkshire Aleocharinae.

However, the few coleopterists interested in the group continued to collect, identify and record their findings, and several species new to Yorkshire or the respective vice-counties were encountered. The list which follows documents these findings, along with several other significant records which have hitherto gone unnoted. This report would not be so full, nor so accurate, had it not been for the considerable help afforded by

Mr C. Johnson of the Manchester Museum. Without his immense knowledge, many unidentified or mis-named specimens would have still remained.

For reasons described in the original report, the sex of the specimen(s) on which identification was based has been indicated; it can be assumed that all specimens were male, unless otherwise stated.

Initials used in the list that follows are those of M. L. Denton, W. A. Ely, C. Johnson, P. Kendall, R. J. Marsh, D. Maude, D. A. Pitcher and E. J. Smith.

This list introduces the names of 16 species new to the county and 34 new to one or other of the vice-counties.

†New records * New vice-county records.

Oligota parva Kra. (*62) Thirsk (SE58), 13/10/86, grass cuttings; R.J.M. (teste C.J.)

O. picipes Steph. (*63) Stoney Royd (SE30), female, 25/1/87, sallow carr litter; E.J.S. det. C.J. The only previous records are from Saltergate (SE89) in 1937 and Spurn (TA41) in 1948.

O. punctulata Heer. (*63) Sprotbrough (SE50), female, 28/10/87, old straw heap; R.J.M. (teste C.J.). The only previous record was from Askham Bog (SE54) in 1969.

O. pusillima Gr. (*62) Thirsk (SE58), both sexes, 13/10/86; R.J.M. (teste C.J.). The only previous record was from Spurn (TA41) on an unrecorded date.

Myllaena infuscata Kra. (*61) Hornsea Mere (TA14), 29/11/86, sedge litter; R.J.M. (teste C.J.). Bubwith Bridge (SE73), female 24/6/87, reed litter; R.J.M. (teste C.J.).

M. minuta Gr. (64) Askham Bog (SE54), 21/3/87; R.J.M. (teste C.J.); Sprotbrough (SE50) and Knaresborough Ringing Station (SE35) have yielded the only previous records.

Placusa depressa Maklin. (63) Wharncliffe Wood (SK29), both sexes, 1/11/87, gill fungi; E.J.S. (teste C.J.). The only previous record was from Stocksmoor (SE21) in 1971.

†*P. tachyporoides* Walt. (64) Bishop Wood (SE53), not sexed, 20/10/85; P.K. det. R.J.M. (teste C.J.).

Leptusa pulchella Mann. (62) Allerston Rigg (SE89), 30/7/87; D.A.P. det. C.J. (63) Dean Wood (SE11), both sexes, 11/1/86, under bark; E.J.S. Holes Clough (SK29), female 6/12/86; E.J.S. Mulgrave Wood (NZ81), Crimpsall Ings (SE50) and Duncombe Park (SE68) have yielded the only previous records.

†*Heterota plumbea* Wat. (61) Spurn (TA41), 21/10/84; M.L.D.

Bolitochara mulsanti Sharp. (62) Skelder (NZ80), 23/8/74, fungoid oak branch; C.J. Allerston Rigg (SE89), 30/7/87; D.A.P. det. C.J. (*63) Elland Park Wood (SE12), female, 21/9/85, under bark; E.J.S. Langsett (SE20), 26/7/87, gill fungi; E.J.S. (teste C.J.). Rivelin Valley (SK38), female, 8/11/87, decaying fungi; E.J.S. The only previous record was from Kildale Wood (NZ60) in 1917.

Autalia impressa Ol. (*61) Thornton Ings (SE74), 25/9/87; E.J.S.

A. longicornis Sch. (63) Melton Wood (SE50), female 23/8/86, grass cuttings; R.J.M. (teste C.J.). Wharncliffe Wood (SK29), female, 1/11/87, gill fungi; E.J.S. The only previous records are from Elland Park Wood (SE12) and Langsett (SE20) in 1985.

†*Falagria sulcatula* Gr. (63) Royd House Wood (SE11), 25/11/84; D.M. det. M.L.D. Blackmoorfoot (SEO1), 9/9/85; M.L.D.

Gnypeta rubrior Tott. (63) Langsett (SE20), 10/5/87; *Juncus* refuse; E.J.S. (teste C.J.). Blackmoorfoot (SEO1), Spurn (TA41) and Robin Hood's Bay (NZ90) have yielded the only previous records.

Schistoglossa gemina Er. (63) Rossington Bridge (SE60), female, 6/5/87, *Carex* refuse; R.J.M. (teste C.J.) The only previous records are from Askham Bog (SE54) in 1971 and Rushy Moor (SE51) in 1985.

†*Aloconota currax* Kra. (63) Dunford Bridge (SE10), female, 16/6/87; M.L.D.

A. sulcifrons Steph. (*63) Salt Springs Wood (SK29), female, 21/11/83; E.J.S. Lindley Wood (SE20), 16/3/84; E.J.S. (teste C.J.) Salterhebble (SE02),27/3/84, reed litter; M.L.D. Morton Wood (SE10), female, 9/3/85; D.M. det. C.J. Drop Clough (SEO1),

3/10/86; D.M. det. M.L.D. (teste C.J.). Ewden Beck (SK29), female, 20/4/87; E.J.S. Crooksmoor (SK38), female, 4/8/87; E.J.S.

Amischa cavifrons Sharp. (*62) Strensall Common (SE65), 13/10/85; M.L.D.

A. decipiens Sharp (*62) Duncombe Park (SE68), female, 28/9/87, under bark; R.J.M. (teste C.J.).

†*A. forcipata* Mul. & Rey. (61) Derwent Ings (SE73), female, 19/7/87, old straw heap; R.J.M. (teste C.J.).

Amidobia talpa Heer. (*61) Sunk Island (TA21), 17/8/86, old grass cuttings; M.L.D.

Lyprocorrhe anceps Er.(*64) Fairburn (SE42), female, 10/10/86; M.L.D. The only previous records are from Agden (SK29), Kaye Wood (SE11), Raincliffe Wood (SE98), Harwood Dale (SE99), Hellwath Beck (SE99) and Scarborough (TA08).

Brundinia meridionalis Mul. & Rey. (61) Sunk Island (TA21), female, 17/8/86; R.J.M. (teste C.J.). The only previous record was from Spurn (TA41) in 1952.

Dochmonota clancula Er. (*61) North Duffield Carrs (SE63), 25/9/87, mole's nest; M.L.D. det. C.J. (*63) Guisbrough (SK59), both sexes, 25/6/86; R.J.M. (teste C.J.). The only previous records are from Askham Bog (SE54) in 1969 and 1972.

Dadobia immersa Er. (*63) Lindley Wood (SE20), 16/3/86; E.J.S.

Liogluta nitidula Kra. (62) Kildale Moor (NZ60), 6/10/87, pit fall trap; York University det. M.L.D. (63) Broom Valley (SK29), female, 16/5/86; W.A.E. det. M.L.D. Drop Clough (SE01), 20/9/87, fungi; M.L.D. Kildale (NZ60), Keld (NY51), Penyghent (SD87) and Langsett (SE20) have yielded the only previous records.

L. oblongiuscula Sharp. (*61) Aughton Ings (SE63), female, 29/5/87; M.L.D.

†*Atheta arctica* Thom. (63) West Nab (SE00), 7/6/87, sheep dung; M.L.D.

A. gyllenhali Thom. (63) Elland gravel pit (SE12), 16/4/83; M.L.D. Deer Hill (SE01), 9/7/85, flood refuse; M.L.D. The only previous records are from Bubwith (SE73) in 1916, Yedingham (SE87) in 1931 and Bretton (SE21) in 1971.

A. obtusangula Joy. (*62) Bilsdale (SE59), 29/5/87; W.A.E. (teste M.L.D.).

A. volans Scriba. (63) Sprotbrough (SE50), sex ?, 3/5/85; R.J.M. (teste C.J.). The only previous records are from Scarborough (TA08) in 1926, Spurn (TA41) in 1949, Shepley (SE10) in 1971 and Hornsea Mere (TA14) in 1972.

†*A. vilis* Er. (63) Sprotbrough (SE50), female, 14/7/87; R.J.M. (teste C.J.).

A. euryptera Steph. (*64) Fairburn Ings (SE42), 11/7/87; M.L.D. (teste C.J.). Egton (NZ80), Whitby (NZ81), Shirley Pool (SE51) and Thorne Moor (SE71) have yielded the only previous records.

A. liturata Steph. (62) Duncombe Park (SE68), both sexes, 28/9/87, in *Polyporus;* R.J.M. (teste C.J.). The only previous record was from the same locality on 10/9/85.

†*A. spatuloides* Benick. (62) Duncombe Park (SE68), female, 10/9/85; R.J.M. det. C.J.

A. cadaverina Bris. (63) Drop Clough (SE01), 18/9 and 26/9/87, rabbit dung; D.M. det. M.L.D. The only previous records are from Langsett (SE20) in 1984 and 1985.

A. gagatina Baudi. (61) Potter Brompton (SE97), 21/6/86; R.J.M. (teste C.J.). (*63) Elland gravel pit (SE12), 7/8/83; M.L.D. (teste C.J.). (*64) Fairburn Ings (SE42), female, 30/8/87, reed debris; M.L.D. (*65) Birk Gill (SE18), 7/7/84; M.L.D. Langdale (SE99) and Skipwith (SE63) have yielded the only previous records.

A. amplicollis Mul. & Rey. (*62) Thirsk (SE58), female, 13/10/86; R.J.M. (teste C.J.). (63) Langsett (SE20), female, 27/2/87, leaf litter; E.J.S. (teste C.J.).The only previous record was from Digley (SE10) in 1985.

†*A. orbata* Er. (61) Sunk Island (TA21), female, 17/8/86; R.J.M. (teste C.J.). (63) Sprotbrough (SE50), female, 2/7/85 and 13/8/86; R.J.M. (teste C.J.). Cridling Stubbs (SE52), 5/10/85, leaf litter; R.J.M. (teste C.J.). Eggborough (SE52), female, 15/6/86; R.J.M. (teste C.J.). Lower Denby (SE20), female, 12/10/86; E.J.S. Gunthwaite (SE20), female, 26/10/86; E.J.S.

†*A. canescens* Sharp. (63) Eggborough (SE52), female, 24/5/85; R.J.M. (teste C.J.).

A. dadopora Thom. (63) Elland Park Wood (SE12), 22/9/85; E.J.S. (teste C.J.). Melton Wood (SE50), female, 8/10/86, grass cuttings; R.J.M. (teste C.J.). The only previous record was from Melton Wood (SE50) in 1985.

A. nigra Kra. (*65) Nosterfield (SE28), 14/4/87, cow dung; M.L.D.

A. aquatica Thom. (*61) Ganton (SE79), 21/6/86; M.L.D.

A. hypnorum Kies. (*61) Aughton Ings (SE63), female, 19/8/87, horse dung; M.L.D.

A. intermedia Thom. (*63) Elland Park Wood (SE12), female, 21/9/85; E.J.S. The only previous record was from Malham (SD86) in 1954.

A. oblita Er. (*61) Potter Brompton (SE97), female, 21/6/86; R.J.M. (teste C.J.). The only previous record was from Saltburn (NZ62) as long ago as 1897.

A. cinnamoptera Thom. (*63) North Dean Wood (SE02), 13/8/83; M.L.D. Drop Clough (SE01), female, 1/11/86; D.M. det. M.L.D. Langsett (SE20), female, 18/4/87; E.J.S. Ewden Beck (SK29), both sexes, 20/4/87; E.J.S. Drop Clough (SE01), both sexes, 18/9/87, rabbit dung; D.M. det. M.L.D. Reaps Wood (SK38), female, 8/11/87, fungi; E.J.S.

A. ischnocera Thom. (*62) Duncombe Park (SE68), female, 26/5/87, cow dung; R.J.M. (teste C.J.).

A. laevana Mul. & Rey. (*63) Langsett (SE20), both sexes, 18/4/87; E.J.S. Drop Clough (SE01), 20/11/87, fungi; D.M. det. M.L.D.

†*A. picipennis* Mann. (63) Abbey Brook (SK19), female, 15/11/87, gill fungi; E.J.S. (teste C.J.).

A. setigera Sharp. (63) Drop Clough (SE01), 1/6/86; D.M. det. C.J. Rivelin Valley (SK38), female, 21/11/86; E.J.S. Spurn (TA41), Malham (SD86) and Lindley Wood (SE20) have yielded the only previous records.

Dinarda maerkeli Kies. (*63) Hardcastle Crags (SD93), female, 6/6/86, with the ant *Formica lugubris* Zett.; M.L.D. This is the first record away from VC62 and the first since 1972.

†*Ilyobates propinquus* Aube. (63) Rossington Bridge (SK69), sex ?, 5/85; R.J.M.

†*I. subopacus* Palm. (61) Bubwith Bridge (SE73), sex ?, 24/4/85; P.K. det. R.J.M. (63) Shirley Pool (SE51), 19/7/86; R.J.M. (teste C.J.).

Chiloporata longitaris Er. (*64) Drax (SE62), 5/6/87; E.J.S.

Ocalia dadia Er. (62) Raincliffe Wood (SE98), both sexes, 8/1/86; M.L.D. det. C.J. Scarborough (TA08), Upper Windleden Reservoir (SE10), Tadcaster (SE44) and Forge Valley (SE98) have yielded the only previous records.

†*Meotica exillima* Sharp. (63) Agden (SK29) not the Yorkshire Wildlife Trust reserve, both sexes, 14/2/87; E.J.S. Rushy Moor (SE51), female, 31/3/87, sedge litter; R.J.M. (teste C.J.).

Deubelia picina Aube. (*62) Duncombe Park (SE68), female, 28/9/87, under bark; R.J.M. (teste C.J.). The only previous record was from Collingham (SE34) in 1917.

Mniusa incrassata Mul. & Rey. (*61) Thornton Ings (SE74), female, 29/5/87; M.L.D.

Oxypoda amoena Fair & Lab. (63) Langsett (SE20), female, 23/8/86; E.J.S. Spurn (TA41), Kilnsea (TA41) and Hade Edge (SE10) have yielded the only previous records.

O. annularis Mann. (*61) Sunk Island (TA21), female, 17/8/86, old grass cuttings; M.L.D.

†*O. brachyptera* Steph. (61) Aughton Ings (SE63), both sexes, 7/7/87; R.J.M. (teste C.J.).

O. exoleta Er. (61) Sunk Island (TA21), both sexes, 17/8/86, old grass cuttings; M.L.D. and R.J.M. (teste C.J.). The only previous records are from Lockwood (SE11) in 1948 and Spurn (TA41) in 1950 and 1951.

O. lentula Er. (61) North Duffield Carrs (SE63), 25/9/87; M.L.D. det. C.J. The only previous records are from Saltburn (NZ62) in 1898 and Bubwith (SE73) in 1921. This is a scarce species within the British Isles.

O. nigricornis Mot. (63) Drop Clough (SE01), female, 27/9/87, rabbit dung; D.M. det. M.L.D. The only previous records are from Malham (SD86) in 1967 and Brun Moor (SE00) in 1985.

Haploglossa nidicola Fair. (*64) River Wharfe near Grass Wood (SD96), not sexed, 11/10/86, from a Sand Martin nest; M.L.D.

Aleochara albovillosa Bern. (63) Blackmoorfoot (SE01), 8 and 9/83, 10/84 and 10/86; M.L.D. (teste C.J.). Harden Clough (SE10), 5/1/85; D.M. det. M.L.D. March Haigh (SE01), 28/9/85; D.M. det. M.L.D. Drop Clough (SE01), 9 and 10/87, rabbit dung; D.M. det. M.L.D. The only previous record was from Ravensknowle Park (SE11) in 1966.

A. bipustulata L. (*64) Fairburn Ings (SE42), 24/8/86, carrion; M.L.D.

A. curtula Goez. (*65) Colsterdale (SE18), not sexed, 2/6/79; W.A.E.

A. intricata Mann. (61) Sunk Island (TA21), 17/8/86, old grass cuttings; R.J.M. (teste C.J.). Spurn (TA41), Whitby (NZ81), Kearby (SE34) and Huntington Wood (SE65) have yielded the only previous records.

†*A. moerens* Gyll. (63) Langsett (SE20), 2/9/85; E.J.S. (teste C.J.).

Errata

The following corrections relate to the last Aleocharinae report:

Alianta incana Er. The record from Melton Wood (SE50) on 16/5/85 was given in error. The correct entry should read: Conisbrough (SK59), both sexes, 16/5/85, reed litter; R.J.M. (teste C.J.).

Aleochara lata Gr. The records of this species from Cat Babbleton (SE97), Rainsbrough (SK39) and Sandbeck Park (SK59) documented as new for Yorkshire are now found to be erroneous. The species is therefore removed from the Yorkshire list.

YORKSHIRE NATURALISTS' UNION EXCURSIONS IN 1987

Compiled by C. S. V. YEATES and W. A. ELY

AUSTWICK AND LAWKLAND MOSSES (VC 64), 30 May (D. P. Savage)

The owner of the Mosses, Lt Col Field, and his dog turned out in the rain to meet us. He showed concern for the natural history of the Mosses, and said he welcomed YNU members and other naturalists who wanted to visit them. Mention was made of recent sightings of Roe Deer on Austwick Moss, and the fact that two people still have rights of turbary, one on each Moss. However, these rights are not used and there is no peat digging at present.

The party of fifteen members set off down the old turbary road to Austwick Moss, and after some initial dispersal resolved themselves into two groups, each spending the morning on Austwick Moss and the afternoon on Lawkland. The rain had started just before we met and continued steadily until well into the afternoon. However, by the time we met at Austwick parish hall for tea the sun shone brightly.

We were met at tea by Mr Ely, the sole entomologist present, who had arrived late in the morning and worked Austwick Moss alone all day. The meeting was led by Dr Lloyd-Evans and started with an informal report of sightings in groups for which we did not have an expert present. Both groups had seen Roe Deer, one group getting a very close view while eating lunch near Fen Beck. Rabbit, Hare, Mole, a Frog and the following birds were seen: Lapwing, Curlew, Snipe, Redshank, Swift, Swallow, Skylark, Pied Wagtail and Sedge and Willow Warblers. Lepidoptera seen despite the rain were Green-veined White, Orange Tip, Green Hairstreak and Pebble Hook-tip.

More formal reports followed and a vote of thanks was given to Lt Col Field.

Geological Background (D. Bramley)

The Mosses occupy the low area of ground in the Craven Gap between the dramatic height of Ingleborough and the low hills leading to the Forest of Bowland. They are also on the Craven fault, where the downthrow on the west has lowered the Millstone Grit series (capping Ingleborough) below the level of Mountain Limestone forming the visible base of Ingleborough.

The two Mosses are therefore fed with some drainage from the west which is acid, and some from the east (the direction of Ingleborough) which is alkaline. This accounts for the interesting mixture of micro-habitats found along the eastern fringes of the Moss. The bulk soil is Boulder Clay, but the depth of peat is quite considerable and has been worked in the past.

Mollusca (L. Lloyd-Evans)
The only molluscs seen were the black slug *Arion ater*, the banded snail *Cepaea nemoralis* and the succinoid *Oxyloma pfeifferi*; the latter was confirmed by dissection.

Entomology (W. A. Ely)
Heavy rain and dripping vegetation make life difficult for an entomologist, so I ventured on to Austwick Moss, armed only with a pond net and a sieve, prepared to spend time searching for insects instead of relying upon the sweep net to find them for me. After a while the rain stopped and insects, particularly flies, began to appear. Eventually the sun shone and the insects became quite numerous. The pond net was pressed into service as a sweep net and, while not as efficient as the real thing, it was possible to collect insects from wet vegetation when a normal net would have been useless.

There were plenty of common insects, together with a number of scarce ones which are detailed here. The ground bug *Trapezonotus arenarius* is usually found in well-drained areas. Among the water beetles were the carnivorous *Hydroporus discretus* and the herbivorous *Enochrus ochropterus*, while the leaf-beetle *Plateumaris sericea* is also associated with aquatic vegetation. These insects had to be picked out from the large numbers of water spiders which cluttered up the net. Among the small selection of weevils was the squat red *Coeliodes rubicundus*.

Craneflies were particularly numerous, flying in the hollows and underneath the hanging vegetation. *Phalacrocera replicata*, nationally rare, but well-known from this site, was flying in some numbers. The medium-sized *Limnophila phaeostigma* (a dark-coloured northern species which is usually found in Scotland) and *L. fasciata* (a very rare cranefly with spotted wings) were found, as well as the tiny yellow *Ormosia pseudosimilis* and the equally tiny black *Molophilus ater*. The latter is wingless and lives in upland areas, where the ability to fly may be a positive disadvantage in the strong winds and high rainfall.

The larvae of most craneflies live in damp soil and the same is true of empid and doly flies, which are carnivorous as both larvae and adults. The empids included *Rhamphomyia stigmosa* and *R. curvula* (the latter is nationally uncommon) and the doly *Dolichopus lepidus* was found. The tiny black fly *Themira pusilla*, whose larvae feed in decaying material, was collected and the minute cynipid wasps included *Phaenoglyphis villosa* and *Alloxysta abdera*, whose larvae are hyperparasitic on the larvae of aphidiid wasps, which in turn are parasitic in aphids; both are new to the vice-county.

Other Arthropods (D. T. Richardson)
The paucity of woodlice, centipedes and millipedes at both Austwick and Lawkland Mosses reflects the extremely wet, acid condition of these sites and emphasises the effect of immediate habitat. It is not surprising, therefore, that the ubiquitous *Oniscus asellus*, *Porcellio scaber* and *Trichoniscus pusillus* were the only woodlice seen, *Lithobius crassipes* and *Geophilus carpophagus* the only centipedes, and *Tachypodoiulus niger*, *Polydesmus angustus* and *Cylindroiulus punctatus* the only millipedes.

The freshwater shrimp *Gammarus pulex* was plentiful in Fen Beck and the leeches *Erpobdella octoculata*, *Helobdella stagnalis* and *Glossiphonia complanata* were also seen there in quite large numbers. The presence of large numbers of *E. octoculata* may well be an indication that the beck suffers from some degree of pollution.

Bryology (G. Heffernan)
The Mosses proved to be very good sites bryologically, with a wide variety of suitable micro-habitats.

Around the periphery of the wooded Austwick Moss the grass tussocks were interwoven with good growths of *Pleurozium schreberi* and *Pseudoscleropodium purum*. Within the woods, tree trunks were well-covered with species such as *Dicranoweisia cirrata, Orthodontium lineare* and *Hypnum cupressiforme*, while the plentiful rotting trunks and stumps were host to the liverwort *Lophocolea heterophylla*, abundantly fertile with pale fragile sporogonia, and to the beautiful gemma-bearing moss *Tetraphis pellucida*.

Of course, the major contributors in terms of biomass and ability to affect the habitat were the Sphagna, very much in evidence in the wetter areas and beneath the trees. *Sphagnum cuspidatum* was prominent in the bodies of water formed by the peat diggings, dug not in the traditional manner for fuel, but as a conservation measure designed to keep the moss open with areas of free water. Other species, notably *S. papillosum*, the pale red *S. subnitens* and the striking crimson *S. capillifolium* var. *rubellum* contributed to the build-up of hummocks in between the pools. (Whether there is active building in the 'hummock-hollow' cycle despite conservation efforts is not clear.) In the drier parts of the bog were *S. palustre*, often found in shady parts beneath tree cover, and the slender *S. fimbriatum*, forming fairly extensive patches like 'lawns' under the birches and willows.

Massive rounded clumps of another water-retaining moss, *Leucobryum glaucum*, were found on leaf mould on the edges of wetter areas, while in the more calcareous lower part of the Moss was *Calliergon cuspidatum*. Another *Calliergon*, *C. cordifolium*, was much in evidence on patches of open wet ground, its shining yellow-green shoots standing out even in shade.

In Lawkland Moss was *Dicranum bonjeanii*, in wetter, less acidic parts than the commoner *D. scoparium*. Nearby were *Climacium dendroides* and *Thuidium tamariscinum*, the former of robust dendroid habit and the latter like a miniature fern.

Mycology (M. W. Sykes)
The ascomycete 'Eyelash Fungus' *Scutellinia scutellata* was seen first on decaying woody material and, some twenty yards further on, a large area was found covered with specimens. The agarics *Galerina sphagnorum* and *Omphalina sphagnicola* were found growing in the moss both at Austwick and Lawkland. The bracket fungi *Piptoporus betulinus* and *Phellinus igniarius* were observed growing on *Betula* and *Salix pentandra* respectively.

Plant Galls (D. P. Savage)
The most visually dominant plant galls were the brightly coloured distortions caused by the aecidial stages of rust fungi. Seven species of rust were seen in all. The vivid orange of *Triphragmium ulmariae* on *Filipendula ulmaria* was prominent and remarked upon by several people. The stem of an *Urtica* twisted into a spiral by *Puccinia caricina* also caused some excitement for one person.

Common galls caused by mites were seen on several hosts and one gall caused by a gall midge was seen. May is a little early in the year to look for insect galls. However, old galls of the sawfly *Euura amerinae* were found on *Salix pentandra*. The distribution of this gall in Yorkshire very much follows the limited distribution of its host. Other hosts for this insect are cited in the literature, for example the more common *Populus* species. However the writer has not seen these galls on any other host in the county, even when such alternate hosts have been found close to galls on *S. pentandra*.

SPROTBROUGH (VC 63), 13 June (T. Higginbottom)
The Magnesian Limestone to the west of Doncaster between Sprotbrough and Conisbrough has been quarried for centuries. The River Don had cut through the limestone

to form a gorge, providing a means of transporting stone which was used from Roman times until the early years of this century.

On the eastern banks of the Don is Levitt Hagg Wood. There are many references to Levitt Hagg in *The Flora of West Yorkshire* by F. A. Lees (1888). There are plans to tip household waste in the old quarry.

Sprotbrough Flash Nature Reserve is on the western bank of the Don, the open water of the flash being a product of mining subsidence. On the south-western boundary of the nature reserve is Cadeby Quarry. The northern boundary is formed by Pot Ridings Wood which has many characteristics of an ancient limestone woodland, with a herb-rich flora and *Ulmus glabra* as the dominant tree.

To the west of Boat Inn, the meeting place for this excursion, is an area where the top soil has been scraped away to expose the limestone. This site is well-known locally for the richness of its flora. Permission had also been obtained from the Economic Forestry Group to visit Scabba Wood, an area of mainly deciduous woodland.

Moth and bat enthusiasts met on the Friday night to begin their study of the area. The lepidopterists were led by Mr Beaumont, the YNU Microlepidoptera Recorder, assisted by Mr Botterill, the Sorby Natural History Society's Lepidoptera Recorder. Mr O'Neil and other members of the Sheffield Bat Group made a valuable contribution to our knowledge of the bats to be found around Sprotbrough Flash.

Heavy rain on Friday afternoon and low night temperatures severely restricted the flight of moths. The warm sunshine of Saturday came as a pleasant surprise. Forty members met in the yard of the Boat Inn, with local naturalists eager to show visitors some of the interesting habitats nearby.

Ornithology (P. Humberstone and H. Parkin)

A single male Shoveler was seen on Sprotbrough Flash. Sprotbrough and Farcliffe Flashes each had a single drake Pochard, and Tufted Duck drakes were also recorded. On Sprotbrough Flash Canada Geese had two goslings, the first breeding record for the reserve. Five Great Crested Grebes were seen; there were thought to be at least four breeding pairs in the valley, but their first broods were lost due to inclement weather. Little Grebes were also seen on both flashes and on the River Don, which has proved to be a favourite wintering site.

House Martin and Swift were seen feeding above Sprotbrough Flash and some members sighted Swallows, although few breed in the valley. It is surprising that there was no report of Kingfisher as this species is known to breed in the area.

One of the most notable sightings of the excursion was of Woodcock roding above above Sprotbrough Plantation on Friday night; this species was also recorded in Scabba Wood on Saturday. Great Spotted Woodpecker was heard calling in Levitt Hagg Wood.

Blackcap, Whitethroat and Willow Warbler were frequently encountered. Lesser Whitethroat was observed in willow scrub by the edge of Sprotbrough Flash, where Sedge Warbler was heard calling. Sprotbrough Plantation, an area of deciduous woodland with open areas of *Salix* scrub, proved to be an ideal habitat for Garden Warbler.

Willow Tit was seen at Levitt Hagg Wood and in a corner of Pot Ridings Wood the rather uncommon Lesser Redpoll was sighted in a Sycamore, while a Treecreeper was observed feeding young among the more mature trees. Mr Chris Johnson, a voluntary warden, had without doubt the best sighting of the day when he saw Hawfinch in the trees above Farcliffe Flash.

Entomology – General (J. D. Coldwell)

The entomologists enjoyed good collecting conditions and many insects were in evidence. Most of the localities in this extensive area were visited and a good cross-section of species from a variety of habitats was found.

The area by the south bank of the River Don yielded the Common Groundhopper *Tetrix undulata*, far from common in South Yorkshire, and found by Mr Ely, who also recorded the scarce hoverflies *Criorhina asilica* and *Ferdinandia cuprea*, the rare empids

Platypalpus tonsus (19 specimens of this Red Data Book insect!), *P. albicornis* and *Hilara galactoptera*, the scuttle flies *Phora holosericea* and *P. speighti*, the uncommon psilid *Psila persimilis* and the scarce marsh flies *Pelidnoptera fuscipennis* and *Elgiva cucularia*, whose larvae are snail predators, from nearby Levitt Hagg. Among the ichneumons were *Phradis minutus* and *Monoblastus luteomarginatus* (both new to Yorkshire) and *Polyblastus macrocentrus*, which is the second county record. The cynipid wasps included *Melanips microcerus*, new to Yorkshire, and *Aegilips romseyensis*, the second record for the county. Also here were two species of stilt-legged fly, *Calobata petronella* and the less common *Micropeza corrigiolata*. Several wetland hoverflies were found on the riverside vegetation, most notably *Anasimyia lineata* and *Helophilus hybridus*, species also found at Sprotbrough Flash by Mr Whiteley who also recorded *Criorhina berberina*, evidently a stray from nearby woodland, and the very local *Lejogaster splendida*, a fly predominantly of coastal saltmarsh.

The writer and Mr Whiteley spent most of the afternoon investigating the 'scrape' area of short grassland and woodland edge. Several solitary wasps were collected, including the parasitic sphecid *Nysson spinosus* and the locally uncommon vespoid wasp *Odynerus spinipes*. Spider-hunting wasps were also in evidence, the one specimen captured proving to be the widespread *Arachnospila anceps*. The most notable fly of this habitat was the small black rarely-recorded syrphid *Paragus haemorrhous*. Other species noted were *Pipizella varipes*, *Ferdinandea cuprea* and the remarkably long-legged dolichopodid *Scellus notatus*.

Other interesting finds included the small woodland asilid *Dioctria linearis* – at the northern edge of its range in South Yorkshire – taken by the writer, and the northerly bug *Calocoris alpestris*, reported by Dr Lloyd-Evans. Dr Key took the two old-woodland flies *Xylophagus ater* and *Brachypalpoides lenta* from Pot Ridings Wood. A 'red' lacewing was also admired at the end of the afternoon, a very local Neuropteran of the genus *Notochrysa*.

Entomology – Coleoptera (M. L. Denton)

The weather conditions during the preceeding week had been abysmal but despite very favourable conditions on the day, a thorough search of the area known as the 'scrape' by Messrs Kendal and Denton turned up very few coleopterons of note. A small pool held only the common water beetles *Hydroporus planus*, *Agabus nebulosus*, *Stictonectes lepidus* and *Laccophilus minutus*, and the only member of the Aleocharinae found in this area was a single *Aleochara bipustulata* which was taken from a dead Mole. En route to this area the weevil *Brachysomus echinatus* was swept from Dog's Mercury. I am informed by Mr Flint that although this species is widely scattered in Yorkshire, it is only infrequently seen, and curiously there is only one previous record of it for VC 63. Other weevils seen in the company of this species were the commoner *Apion pallipes* and *A loti*. The Cardinal Beetle *Pyrochroa serraticornis* was scattered throughout the area and another species similarly pleasing to the eye was the Wasp Beetle, *Clytus arietus*.

In the afternoon the above two collectors were joined by Mr R. J. Marsh and the woodland to the north of the disused railway line in Pot Ridings Wood was investigated. The wood yielded little, although the Rhinocerus Beetle *Sinodendron cylindricum* was found in dead wood and *Anisotoma humeralis* was found in fungi. It was quite obvious that a complete survey of this area would reveal some outstanding beetles but in the time available very few species of interest were encountered.

Mr Ely investigated the Levitt Hagg area south of the River Don and found the small rove beetle *Carpelimus zealandicus*, the flea beetle *Phyllotreta nodicornis* and the weevil *Ceuthorhynchus resedae*.

A complete list of species found has been lodged with the Divisional Secretary.

Entomology – Lepidoptera (J. Payne)

Just outside the built-up area of Sprotbrough, a hedgerow Spindle bush was seen to be

covered in webs and completely defoliated. The webs contained the almost full-fed larvae of one of the 'micro' ermine moths *Yponomeuta cagnagella* (Hubner).

The Cadeby Quarry area was the most fruitful place for observing the lepidoptera. The Dingy Skipper was flying in fair numbers as were both males and females of Common Blue and Wall. A single Large Skipper was seen. In the clearings of Pot Ridings Wood Speckled Wood was flying. Short-clasped Treble-bar was disturbed in the quarry and the colour form exactly matched the scree. The disused railway produced Sandy Carpet and Clouded Border. Mullein Moth larvae were reported from Levitt Hagg.

Mr H. E. Beaumont reports that the most interesting micro-lepidoptera seen were *Scythropia crataegella*, larval webs of which were in evidence on *Crataegus* at Sprotbrough (this is a recent addition to the Yorkshire list and evidently well-established here), and at Denaby Ings two moths new to the reserve list, *Teleporia tubulosa* and *Elachista triatomea*.

Flowering Plants and Ferns (M. A. Atherden)

The Don Gorge provided the botanists with a fascinating variety of plant communities, including those of woodland and plantation, old quarries, wetland and the riverside.

The broad-leaved woodlands were dominated by *Acer pseudoplatanus*, accompanied by *Ulmus glabra*, *Fraxinus excelsior*, *Quercus petraea*, *Betula pendula*, *Corylus avellana*, *Crataegus monogyna*, *Prunus avium* and *Sambucus nigra*. In Pot Ridings Wood there were some fine old stands of *Taxus baccata*, planted in the old rides after which the wood is named. In Levitt Hagg Wood there were good stands of *Fagus sylvatica* and *Aesculus hippocastanum*, while in Scabba Wood the shrub layer included *Acer campestre*, *Ilex aquifolium*, *Euonymus europaeus*, *Ligustrum vulgare* and *Rhododendron ponticum*.

The ground floras of the woodlands were dominated by *Mercurialis perennis*, reflecting the calcareous nature of the soils. Other typical woodland species included *Sanicula europaea*, *Ajuga reptans*, *Arum maculatum*, *Hyacinthoides non-scripta*, *Primula vulgaris*, *Lysimachia nemorum*, *Anemone nemorosa*, *Oxalis acetosella*, *Carex sylvatica* (which was dominant in parts of Scabba Wood) and *Brachypodium sylvaticum*. A few plants of *Orchis mascula* were still in bloom in Pot Ridings Wood, while *Neottia nidus-avis* made a poor showing in Sprotbrough Plantation. In wet patches in Scabba Wood *Lychnis flos-cuculi* and *Mentha arvensis* were found. In Pot Ridings Wood *Polystichum setiferum* and *Phyllitis scolopendrium* were recorded, the latter growing on the Magnesian Limestone exposed in the old railway cutting.

Quarrying activity had provided many opportunities for limestone grassland to become established. The area to the west of Sprotbrough Plantation was scraped in the 1950s ready for quarrying which never took place. The Yorkshire Wildlife Trust has an agreement with the owners by which it manages the area and uses it for natural history studies. Invasion by trees and shrubs is rapid, but parts are cut back each year to maintain an open flora, which included *Viola hirta*, *Malva moschata*, *Blackstonia perfoliata*, *Centaurium erythraea*, *Lithospermum officinale*, *Erigeron acer*, *Leucanthemum vulgare*, *Listera ovata*, *Festuca rubra* and *Desmazeria rigida*. The party failed to observe any specimens of *Ophrys apifera* or *O. insectifera*, both of which would have been blooming in a normal year.

Adjacent to Cadeby Quarry was a limestone waste tip which is destined for restoration in the near future. Experimental plantings of trees and agricultural grasses have been made. The restoration will destroy an interesting colony of orchids comprising *Dactylorhiza praetermissa* and *D. praetermissa x fuchsii*. Other unusual plants here included *Lupinus arboreus* and *Reseda lutea*. By the roadside west of the Boat Inn *Papaver argemone* was found. South of the river in Levitt Hagg Quarry other interesting limestone plants included *Reseda luteola*, *Geranium pyrenaicum*, *Papaver somniferum*, *Rhinanthus minor*, *Galium mollugo*, *Lactuca serriola*, *Tanacetum vulgare* and *Dactytorhiza fuchsii*. One or two plants of garden origin, including *Cotoneaster horizontalis* and *Lycium barbarum*, added to the range of species. Many of the plants growing beside

the road in this area attain abnormal size, probably as a result of regular unofficial doses of fertiliser from the dust of the limestone quarry!

Beside the River Don and in Sprotbrough Flash Nature Reserve plants tolerant of waterlogged soils were found. *Glyceria maxima* dominated large areas, accompanied by *Typha latifolia* and *T. angustifolia*, *Scrophularia auriculata*, *Veronica becca-bunga*, *Stellaria nemorum* and *Chelidonium majus*. *Saponaria officinalis* growing beside the river may have been planted originally for use in the nearby textile industry. This species is an attractive and abundant feature of the Don along its length from below Sheffield. The river was lined with *Salix fragilis* and *Alnus glutinosa*. In open water areas *Elodea canadensis* was observed.

Bryology (C. Wall)

Two threatened sites in the Don Gorge, Levitt Hagg Quarry and Pot Ridings Wood, were examined for bryophytes. Levitt Hagg has a high reputation among Yorkshire bryologists, being the focus of a number of past excursions.

The small acrocarpous moss *Desmatodon cernuus*, which always evoked comment in the accounts of previous visits, is a national rarity and heads a list of interesting bryophytes characteristic of the Magnesian Limestone. A search over the network of powdered limestone tracks in the quarry complex produced old *Desmatodon* capsules in company with its usual associate *Leptobryum pyriforme* and masses of *Funaria hygrometrica* with its capsules in various stages of maturity.

It proved impossible to locate many of the saxicolous species known to inhabit Levitt Hagg because of the banks of nettles growing against the quarry face. More success was achieved examining loose boulders in open areas, and here *Tortula marginata*, *Aloina aloides* var. *aloides*, *Barbula hornschuchiana* and *B. tophacea* were found. Steep banks of friable limestone yielded luxuriant *Campylium stellatum* and *C. chrysophyllum*, with occasional light green patches of *Mnium stellare*. The thalloid liverworts *Lunularia cruciata*, *Marchantia polymorpha*, *Aneura pinguis* and *Riccardia chamaedryfolia* were found in damp corners on the quarry floor.

Bryophytes common to both Levtt Hagg and Pot Ridings Wood included *Encalypta streptocarpa*, *Tortella tortuosa*, *Barbula recurvirostra*, *B. cylindrica*, *Rhynchostegium murale*, *Taxiphyllum wissgrillii*, *Ctenidium molluscum* and the leafy liverworts *Leiocolea turbinata* and *Plagiochila porelloides*. At Pot Ridings Wood most of the species were recorded in and around a disused railway cutting, and in a dark recess of the limestone *Eucladium verticillatum* was found.

Eurhynchium striatum flourished beneath a canopy of young *Acer pseudoplatanus* which however produced few opportunities for epiphytes; only *Bryum flaccidum* was of interest. This species was also found with *Orthotrichum diaphanum* on a riverside willow.

I am grateful to Mr T. Blockeel for providing confirmation of *Barbula tophacea* and *B. hornschuchiana*.

Mycology (C. S. V. Yeates)

The damp conditions which had prevailed over the weeks before the meeting meant that from a mycological standpoint there was much of interest, many species with few previous Yorkshire records being seen.

Several agarics were encountered, including *Hygrocybe langei* which was in some quantity in Levitt Hagg Quarry; Mr Sykes found *Leptonia incana* here and also *Lepista sordida* on the roadside near the Boat Inn.

Micro-fungi were abundant on numerous substrata. Rusts of note included *Puccinia tanaceti* on *Artemisia absinthium* and Mrs Payne found *P. conii* on *Conium maculatum* near Cadeby. *P. calcitrapae* was collected on *Carduus acanthoides* by Sprotbrough Flash; this represents a new host for this rust in Yorkshire.

Among the ascomycetes found were *Pyrenopeziza mercurialis* on *Mercurialis perennis*, *P. escharodes* on *Rubus fruticosus*, *Mollisia clavata* on *Cirsium arvense* and the tiny but attractive *Laetinaevia carneoflavida* on dead *Urtica* stems. Mr Sykes collected the bright

red *Pulvinula convexella* from soil in Levitt Hagg Quarry. Dead *Pteridium* stems produced *Phomatospora endopteris*, while *Ophiobolus cirsii* was found on *Cirsium arvense*, *Leptosphaeria luctuosa* on *Phalaris*, and *Diapleella clivensis* on *Urtica*; the latter appears to be new to the vice-county.

The downy mildew *Peronospora niessleana* was found on *Alliaria* leaves near Levitt Hagg Wood and the powdery mildew *Erysiphe verbasci* (in its conidial state) on a *Verbascum* species (not *V. thapsus*) in Levitt Hagg Quarry.

Coelomycetes included the *Phoma lingam* state of *Leptosphaeria maculans* acting as a secondary invader on the mildewed *Alliaria*, *Ascochyta mercurialis* on senescent *Mercurialis* leaves, and *Camarographium stephensii*, with its distinctive large brown muriform conidia was not uncommon on dead *Pteridium* stems at the southern edge of Pot Ridings Wood. The hyphomycete *Periconia cookei* was collected on dead *Urtica* stems; although noted as being uncommon in *A Fungus Flora of Yorkshire 1985*, this is encountered fairly frequently on this substrate, in South Yorkshire at least.

Plant Galls (J. A. Pearson)

The total of only 28 different plant galls recorded during the day was evidence that galls had been adversely affected by the wet and unpleasant weather conditions which continued through spring and summer. In a more normal year a plant gall recorder would expect to record more than this.

Mrs Payne, while searching an *Ulmus* tree for larvae of Lepidoptera, found the leaf gall caused by the gall-midge *Janetiella lemei*, and Mr Savage found the mite gall of *Epitrimerus trilobus* on *Sambucus nigra*. Both are new records for the site and possibly for the 10 km square.

It was pleasing to record the two midge galls *Dasineura acrophila* on *Fraxinus* and *D. marginemtorquens* on *Salix fragilis*. The former has, in my experience, been increasing steadily in number for the last four or five years. Another pleasing record was of *Eriophyes convolvens*, a mite gall on *Euonymus europaeus*.

An interesting and enjoyable day, but typical of this year not a particularly productive one.

THORNWICK BAY (VC 61), 4 July (B. S. Pashby)

Thornwick Bay is the middle one of three similar bays on the north-east facing section of the Flamborough headland. The North Landing is close by to the south-east, with the smaller Sanwick Bay to the north-west. The chalk cliffs in this area are about 40 m high, having dropped suddenly from 90 m at Cat Nab just under a mile to the north-west. Each of the bays provides reasonable access down to the shore and, most importantly, to the various marshy areas resulting from erosion and landslips and which are fed by runnels above. Mr Grant reported the presence of a large boulder of basalt, which had obviously been carried here by glacial activity from further north, possibly Teesdale. The southern section of Danes' Dyke, on the opposite side of the headland, was visited by the bryologists.

Ornithology (M. Densley)

The main interest of the area is the cliff-breeding seabirds, and the cliffs and fields adjoining their tops were explored from Thornwick Bay as far east as Breil Nook. When time and opportunity permitted some sea-watching was carried out, aided by the excellent visibility.

The cliffs here do not hold the density of breeding birds of nearby Bempton, and Gannet is absent here as a breeding species, but in many places much closer views of the colonies are possible. Good numbers of Puffins, Razorbills, Guillemots, Herring Gulls and Kittiwakes were present and judging from the lack of young on the cliffs or on the sea the auks appeared to have had a disastrous breeding season. By contrast, the large downy young of the Herring Gull were seen in a number of places, and all

the Kittiwake nests appeared to contain at least two young, most on the point of fledging; only one bird of the year was seen actually on the wing.

A number of Shags – still a scarce Yorkshire breeding bird – were seen, plus one Cormorant, while at sea small parties of almost exclusively adult Gannets, presumably from nearby Bempton, were noted throughout the day. Fulmars too were much in evidence and many of the doves on the cliffs showed all the classic plumage features of the Rock Dove.

The cliff-breeding House Martins of the area (known here for a hundred years) are a well known local phenomenon, rarely recorded elsewhere. Their numbers here greatly exceeded those at Flamborough in my experience. The *Phragmites* beds near the car park and also damp places on the cliffs held singing Sedge Warblers, Reed Buntings and Wrens and, for an observer from inland, it was of interest to note Rock Pipit and good numbers of Corn Buntings. The latter species has declined inland of late.

Between them, the ornithologists recorded 34 species of birds.

Other Vertebrates (M. Densley)
Frogs were noted in more than one locality. Evidence of Mole was observed and a Grey Seal was seen offshore. The attention of two members was drawn to a persistent clicking sound: a search discovered that the cause was a Short-tailed Vole which was trapped in a discarded soft drinks can and the creature was freed.

Lepidoptera (J. Payne)
Nine species of butterfly were recorded during the day, none of them very remarkable, though it was one of the few days when Small Copper has been reported this year. There was a total absence of Nymphalidae which was disappointing as the migrants often first appear in this coastal zone. In the floriferous valley descending to the beach were large numbers of burnet moths. Those on the wing were all Six-spot Burnet, but some were collected as larvae and pupae emerged a little later as Narrow-bordered Five-spot Burnet; Chimney Sweeper, Common Carpet and Silver-ground Carpet were also present.

Coleoptera (M. L. Denton)
Although several collecting techniques were employed only 34 species of beetle were encountered. The general sweeping of vegetation yielded little and the only species found along the grassy slopes of the cliffs were the chrysomelid *Crepidodera ferruginea* and the weevils *Apion nigritarse*, *A. curtirostre*, *A. erve* and *Gymnetron pascuorum*. The most productive method of collecting was the inspection of a small pile of horse dung near the car park; even so, this only revealed the presence of a few Aleocharine species, namely *Atheta fungi*, *A. triangulum* and *Amischa analis*.

The sieving of decaying seaweed produced a single specimen of *Aleochara algarum*, a maritime species which is parasitic on the larvae of flies (Diptera). Even though this species has been found along the Yorkshire coast between Spurn and Saltburn, this record is only the seventh for the county.

Other Arthropods (P. Lee)
The hot, dry weather conditions meant that collecting myriapods and isopods was hard work. Five species of woodlice, four of millipede and just one centipede were recorded from the area around Thornwick Bay and North Landing. None of the specialist coastal species were found, even though both beaches were searched. All ten recorded species are common in the east of the county but despite this, there were new 10 km-square records for three species. These were the centipede *Lithobius forficatus* and the two millipedes *Cylindroiulus punctatus* and *Proteroiulus fuscus*.

Flowering Plants and Ferns (D. R. Grant)
The botanists spent all day examining the various small bays and their cliffs. There were numerous areas of earth slippage on the sides of the cliffs and in many of these there

were wet runnels and marshy areas. Along the sides of the largest stream that runs down to the sea *Phragmites australis* formed small reed-beds. A feature of all the marshy areas was the abundance of *Pulicaria dysenterica*. Many common maritime plants such as *Armeria maritima* and *Plantago maritima* grew on the cliffs with, in the wetter parts, *Triglochin maritima*, *Juncus gerardii* and *Carex distans*. A reflection of the cold spring was the discovery of *Primula vulgaris* still in flower on the cliff sides.

The dry cliff-tops had *Ononis repens*, *Plantago coronopus*, *Galium verum* and *Aira praecox*. The rarest species encountered here was *Samolus valerandi*, a plant which likes these muddy areas where water percolates out of the cracks formed by earth slippage.

Orchids were frequent, particularly *Dactylorhiza purpurella* and *D. fuchsii*, with *Listera ovata* being noted as well. Uncommon grasses seen were *Glyceria plicata*, *Koeleria macrantha* and *Festuca arundinacea*.

The edge of the main footpath to the North Landing had *Cardaria draba*, *Cerastium glomeratum* and *Plantago coronopus*. One very wet bog near this path held a large colony of *Hydrocotyle vulgaris*, growing with *Anagallis tenella* and *Eleocharis palustris*. In a very muddy runnel in this bog a stonewort was collected; this has been identified by the British Museum (Nat. Hist.) as *Chara vulgaris*.

Bryology (C. Wall)

Danes' Dyke supported a bryoflora fairly typical of deciduous woodland; abundant species included *Mnium hornum*, *Atrichum undulatum*, *Fissidens taxifolius* and *Eurhynchium praelongum*, with *Fissidens bryoides*, *Plagiomnium undulatum*, *Plagiothecium denticulatum* and *P. succulentum* common to frequent. Occasional around the bases of trees were *Plagiochila porelloides*, *Plagiomnium rostratum*, *Isothecium myosuroides* and fruiting *Plagiothecium nemorale*. Despite the underlying chalk, some calcicoles such as *Eurhynchium swartzii* and *E. striatum* were rather scarce, in contrast to the quite extensive pockets of calcifuge species. Often growing in association, these included *Polytrichum formosum*, *Dicranella heteromalla* and *Isopterygium elegans*.

In the humid confines of the stream bed sheets of *Conocephalum conicum* covered the moist earth banks, and minute capsules of *Seligeria paucifolia* were detected on lumps of exposed chalk. Luxuriant cushions of *Cratoneuron commutatum* and *C. filicinum* revealed the presence of an occasional wet flush and the latter two species, in company with *Calliergon cuspidatum*, were found by Mr Grant to be the chief bryological constituents of the cliff-top bogs and flushes around Thornwick Bay and Flamborough.

The Danes' Dyke woodland, mainly *Acer pseudoplatanus* and of no great age, had a surprisingly interesting epiphytic flora. There was much *Metzgeria furcata* and *Dicranoweisia cirrata*, and odd patches of *Dicranum tauricum* and *Zygodon viridissimus* var. *viridissimus*, the latter also being seen in quantity on a concrete bridge. The liverwort *Radula complanata* was noted on two trees and again on an old *Fraxinus* near the coast in company with *Orthotrichum diaphanum*, *O. affine* and *Ulota phyllantha*. There are only four previous records for this last species in VC 61, the most recent being Danes' Dyke and Filey on the YNU excursion in 1903.

My thanks are due to Mr T. Blockeel for confirming the identity of *Ulota phyllantha* and for his comments upon it.

Mycology (C. S. V. Yeates)

Although the collecting conditions were rather unsuitable, there were some interesting finds, particularly among the plant parasites, with several new vice-county records. Among the rust fungi found, the most significant record is of *Uromyces armeriae* on *Armeria maritima*. It was of interest to find telia of both species of rust which attack *Phragmites*, *Puccinia magnusiana* and *P. phragmitis*, together with their aecial stages which were on *Ranunculus repens* and a *Rumex* sp. respectively.

The smut *Ustilago kuehneana*, which attacks *Rumex* species was found on *R. acetosa*, infecting the anthers on the male plants and the ovaries of the females, though it was not seen in the stems.

Plant Galls (J. A. Pearson)
An attractive area, a beautiful day, but not many plant galls to be found. A disappointing total of only eight different galls was recorded during the day. Three galls were caused by rust fungi: *Phragmidium sanguisorbae* on *Sanguisorba minor*, this shows as a bright orange spore mass which thickens the midrib and veins of the leaves; the aecial stage of *Puccinia poarum* on *Tussilago* which produces raised orange spots, often with a purple margin, on the underside of the leaves; and the aecial stage of *Puccinia caricina* on *Urtica dioica* which produces an interesting gall, sometimes bending the stem right over, occasionally into a complete circle.

The five-year survey of Yorkshire gall-midge (Cecidomyiidae) galls had just three records added to it: the terminal rosette gall of *Dasineura crataegi* on *Crataegus monogyna*; the round pink to purple swellings caused by *Geocrypta galii* on *Galium verum* stems; and galls of *Dasineura urticae* which causes a swelling on the leaf-blade and petiole of *Urtica dioica*.

DOWNHOLME PARK (VC 65), 25 July (D. Millward)

Ornithology (G. Alderson)
Due to the location and time of year a limited number of species were observed. The area of deciduous woodland, high pastures and some river banks only produced a total of 26 species. Carrion Crow was the predominant species. On the high ground, where Curlew had young, a pair of Kestrels were seen hovering together and the only other raptor seen was a Sparrow Hawk. Game birds were Pheasant and Partridge. A Wood Pigeon had a nest with two eggs in a thorn bush. On the river were seen an Oyster Catcher, Kingfisher, Dipper and Mallard.

Conchology (P. Lee)
A total of 37 species of mollusc was recorded from the Red Scar and White Scar areas during the day. The most important find was a new 10 km-square record for *Vertigo alpestris*, collected by A. Wardaugh from a limestone wall on the east bank of the River Swale (grid ref. SE112994). *V. alpestris* was first recorded in Yorkshire in 1887 from Bingley. Since then it has been found at just seven other sites, all in the north-west of the county. This record represents the most easterly site where the species is known to still exist in the county.

Other interesting records were of the hairy snail *Ashfordia granulata*, which was also found by A. Wardaugh, and *Azeca goodalli*.

Myriapods and Isopods (P. Lee)
Warm, dry weather combined with a wooded, limestone site previously unworked for myriapods and isopods made for a profitable day's recording. Nine species of woodlice, eight of centipedes and twelve of millipedes were collected during the day from White Scar and Red Scar resulting in seven, five and six new 10 km-square records respectively.

Armadillidium pulchellum, a small, rare pill-woodlouse typically found on limestone scree, was abundant under stones of the thyme-covered scree below Red Scar. The tiny white woodlouse *Trichoniscus pygmaeus* was found under large stones below both White and Red Scars. Several *Haplophthalmus*, another small white woodlouse, were found below White Scar. These have been tentatively named as *H. mengei*, but this has yet to be confirmed as a species new to Britain, very similar to *H. mengei*, has recently been described.

Under the bark of much of the dead wood in the White Scar area were small, thin, pale-brown millipedes. These were identified in the field as the common species *Proteroiulus fuscus* but most of the specimens collected were later identified as the much less common *Nemasoma varicorne*, which is generally whitish-grey in colour.

Arachnology (C. J. Smith)
Twenty-three species of spider were recorded in the riverside wood and the quarry area near the meeting place (SE113995); about twice that number might have been expected a month earlier in the year, but at the end of the season we cannot expect more. None of the species calls for special mention since they are all fairly common species in Yorkshire, although three were new to the 10 km square.

Entomology (W. A. Ely)
The warm, dry weather in a period of rainy days resulted in large numbers of insects putting in an appearance, including a good range of scarce species. The quarry where we parked the cars had a small area of marsh as well as scrub, and here I found the small dark bug *Pachytomella parallela* which lives in dry areas with short grass, the 'doly' flies *Sympycnus aenecoxa* and *Argyra perplexa*, the latter a nationally scarce insect whose males appear as silver flashes as they fly around, the marsh fly *Tetanocera sylvatica* whose larvae feed on snails, the lesser dungfly *Ischiolepta denticulata*, the ichneumon *Barycnemis harpura*, a beetle parasite which is new to the vice-county, and the red ant *Myrmica sabuleti* which, like the bug, occurs in short grassland.

The area between the A6108 and the River Swale was very productive. The mayflies *Heptagenia longicauda* and *Rithrogena semicolorata* were present as well as four species of stoneflies. Bugs included the predatory flower bug *Temnostethus gracilis*, the plant bug *Psallus flavellus* and the froghoppers *Oncopsis subangulata* (on sallows), *O. alni* (on Alder), *Macrosteles septemnotata* (on Meadowsweet) and *Edwardsiana geometrica* (also on Alder). Among the beetles was the nationally scarce *Orchesia minor*, which lives underneath bark. Fifteen species of cranefly were collected including *Limonia trivittata*, a nationally scarce fly which occurs in wet woodland on calcareous soils, and the small *Molophilus bifidus*, *M. corniger* and *M. ochrescens*. Twenty-six species of the carnivorous empid flies were found here and they included the very rare (Red Data Book Category 1) *Platypalpus mikii*, the scarce *P. parvicauda* and *P. cothurnatus*, *Chelifera trapezina* and *C. precabunda* which look like miniature praying mantids, and *Wiedemannia bistigma* and *W. rhynchops* which look as if they are wearing gasmasks and skate around the water surface. The nationally scarce doly *Sympycnus spiculatus* was also found here as well as a selection of acalypterate flies which included *Chyliza scutellata*, *Pslia humeralis* and *P. persimilis* (all nationally scarce species which breed in plant tissue), *Suillia affinis* and *S. imberbis* (fungus breeders, the former nationally scarce), *Euthycera fumigata* and *Pherbellia ventralis* (nationally scarce marsh flies which kill snails) and the lesser dungfly *Coproica vagans* which breeds in decaying material. The sawflies included the vacated leaf-mines of *Heterarthrus aceris* in Sycamore leaves and *Fenusa ulmi* in Elm leaves.

The steep, wooded slopes of White Scar provided an arduous climb but I was rewarded with further specimens of the plant bug *Pachytomella paralella* and also the froghoppers *Oncopsis avellanae* (on Hazel), *Eupteryx stachydearum* (on Wood Sage, also collected by Mr and Mrs Flint), *Cixius cambricus*, a species of low vegetation on mountainsides, and an immature *Issus*. There are two British species of this large squat insect and either would be very significant in North Yorkshire; it is interesting to note that Mr Flint collected *Issus coleoptratus*, the southern species, at Richmond some years ago. The beetles from White Scar included the nationally scarce soldier beetles *Malthodes guttiger* and *M. mysticus*, which are both small dark insects with bright yellow tips to the wing-cases; as these wing-cases only extend half-way along the body, they appear to have a yellow band across the middle. Small numbers of empid flies included further examples of *Platypalpus mikii* and *P. parvicauda*, while the yellow doly *Xanthochlorus tenellus* (also nationally scarce) was also found. The snail-killing fly *Euthycera fumigata* was found again, together with the ichneumon *Oiorhinus pallipalpis* and the solitary wasp *Passaloecus monilicornis*, both of which are scarce in Yorkshire.

Mrs Payne reported that Meadow Brown, Small Heath, Green-veined White and Small Tortoiseshell butterflies were seen and moths included Chimney Sweeper, Twin-spot Carpet and Dingy Shears. Mr Flint collected the large rove beetle *Platydracus*

stercorarius, which has very short, red wing-cases and tufts of yellow pubescence down the abdomen.

Most of the party visited Red Scar in the afternoon where Mr and Mrs Flint collected the sawfly *Tenthredo schaefferi* (new to VC 65) and Mrs Payne reported a good-sized colony of Ringlet butterfly.

Flowering Plants (D. Millward)
By far the most notable find was of a sedge of the *Carex muricata* aggregate, a taxonomically complex group. At the time it was thought to be *C. spicata*, but on closer examination this seemed doubtful and the writer sent the specimen to R. W. David. A further visit to the site, in company with the latter, was made several days later and the sedge was determined as *C. muricata* ssp. *muricata*, a new record for the Vice-county and only the fourth for Britain.

Mycology (C. S. V. Yeates)
The damp nature of much of the area and the variety of vascular plant species available as hosts or substrates resulted in some interesting finds. Larger fungi were limited chiefly to sheep pasture above White Scar and included nothing of great moment. As is so often the case, however, microfungi provided the unfamiliar and the little-recorded, though it should always be remembered that this is a huge field of study with relatively few workers and even new county records need give little cause for self-congratulation.

A case in point is the pyrenomycete *Plagiosphaera immersa* which was found to be growing abundantly on dead *Urtica* stems by the main road near the car park. This appears to be a new county record, yet several books describe it as being common and this could doubtless prove to be the case in Yorkshire.

A possibly different situation obtains with the attractive citrine-yellow discomycete *Hyaloscypha flaveola* which was found on the underside of *Pteridium* fronds, this being the second Yorkshire record. As this is a predominantly summer-fruiting species it does not usually appear during the classic spring and autumn foray periods and is presumably often missed, but that fact notwithstanding it has been actively searched for in other localities since this meeting and has not been found.

Dead stems of another common vascular plant, *Epilobium angustifolium*, provided an interesting substrate record for the small discomycete *Mollisina rubi*, which is normally encountered on dead leaves, especially those of brambles. Also found on the *Epilobium* were the thyriothecia of *Morenoina epilobii*. This is the first record for this genus in Yorkshire, but as the fruiting bodies are scarcely visible in the field with a × 10 hand lens and might well be dismissed as frass by the uninitiated, this is hardly surprising.

Two further 'loculoascomycetes' of note were *Lophiostoma fuckelii* var. *pulveraceum* on dead stems of *Filipendula ulmaria*, and *Sporormiella minima* which appeared on incubated Rabbit dung.

The writer and Mr K. G. Payne spent some time searching for plant parasites and were duly rewarded. Among the more interesting were the downy mildew *Peronospora lotorum*, found on *Lotus corniculatus*, the rust *Uromyces geranii* on *Geranium sylvaticum*, the coelomycete *Asteroma impressum* on *Tussilago* leaves, and the hyphomycetes *Ramularia montana*, *R. scrophulariae*, *R. pratensis* and *R. gei* were collected on *Epilobium montanum*, *Scrophularia nodosa*, *Rumex acetosa* and *Geum rivale* respectively. *R. gei* is a new county record.

Plant Galls (L. Lloyd-Evans)
Twenty-eight kinds of galls were recorded, which is quite a respectable total early in the season. Very conspicuous were the white, woolly blobs on the tips of Thyme shoots caused by the mite *Aceria thomasi*. The fine native Yews on Red Scar were infested with the artichoke galls caused by the midge *Taxomyia taxi*. Oaks were infrequent and their branches mostly inaccessible, but one bore the small bullet gall of the wasp *Andricus lignicola*, a northward extension in Yorkshire.

FIELD NOTE

Records of local and uncommon Curculionidae (Coleoptera) from Cumbria

Caenopsis fissirostris (Walton, J.) Newton Knott, Ravenglass (SD0995). Nicle Wood, Silecroft (SD1481). Eskdale (SD1799). Specimens extracted from leaf litter and moss.
Caenopsis waltoni (Boheman) Nr. Longbarrow, Dent Fell (NY0312). Found at base of *Rumex acetosella*.
Trachyphloeus aristatus (Gyllenhal) Hodbarrow Point, Millom (SD1878). Found under *Thymus drucei*. Nr Kents Bank (SD3975).
Trachyphloeus laticollis Boheman Humphrey Head Point (SD3973). Base of *Plantago coronopus* on cliff top.
Otiorhynchus desertus Rosenhauer Nr Dunnerholme, Askam in Furness (SD2179). In grass roots in limestone quarry.
Polydrusus flavipes (Degeer) Sowerby Wood, Dalston (NY3651). Beaten from *Quercus*.
Tropiphorus obtusus (Bonsdorff) River Eden, Carlisle (NY4256). Crawling on sandy bank.
Sitona onoidis Sharp Nr Foxpit House, Harrington (NX9823). Found at base of *Vicia sylvatica*.
Magdalis carbonaria (Linnaeus) Miterdale (NY1602). On fallen branch in mixed wood.
Acalles ptinoides (Marsham) St Bees Head (NX9511). In deep litter under Gorse bushes on cliff top. This species is mainly associated with oak woods, and is also occasionally found on *Calluna* bushes; occurs up to 600 m in Cumbria.
Acalles turbatus Boheman Beacon Plantation, Ravenglass (SD0994). In litter under Blackthorn bushes.
Hydronomus alismatis (Marsham) Rogersceugh nr Kirkbride (NY2159). Taken on *Alisma plantago-aquatica*.
Orthochaetes setiger (Beck) Chalk Beck, Cumdivock (NY3347). Swept from low herbage, mainly *Prunella vulgaris*. Ravenglass (SD0895). Beaten from *Ulex europaeus*.
Ceuthorhynchidius dawsoni (Brisout) Kirkhead Bank nr Kents Bank (SD3975). Base of *Plantago lanceolata*.
Ceuthorhynchidius thalhammeri Schultze Nr Eskmeals Viaduct, Ravenglass (SD0895). Hodbarrow Point, Millom (SD1878). River Esk (SD1095). Specimens taken at base of *Plantago maritima* on saltmarshes. This species has recently been added to the British list and was first discovered in 1982 at Graveney, North Kent.
Ceutorhynchus atomus Boheman Nr Ravenglass (SD0894). Found on *Arabidopsis thaliana*.
Furcipus rectirostris (Linnaeus) Cosy Corner nr Greenroad Station (SD1883). Beaten from *Prunus padus* in hedge. This species was first discovered in Cumbria in 1979 and has now been recorded from North Yorkshire, Central Wales and Scotland, Inverness.
Mecinus collaris Germar Beckfoot nr Allonby (NY0950). Found at base of *Plantago lanceolata*.
Gymnetron labile (Herbst) Waberthwaite Quarry nr Eskmeals (SD1194). Swept from mixed herbage.
Rhynchaenus foliorum (Muller, O.F.) River Eden, Carlisle (NY4256). Beaten from Common Sallow.
Rhynchaenus avellanae (Donovan) Kingmoor Nature Reserve, Carlisle (NY3758). Sweeping below Sallow bushes.

R. W. J. READ
43 Holly Terrace, Hensingham, Whitehaven, Cumbria.

Photo: Arthur Gilpin

WHOOPER SWAN

Each year large numbers of Whooper Swans leave their Northern breeding grounds to spend the winter in Britain. The sight of the flocks of these great birds in flight, and the sound of their bugle-like calls, can be trusted to set the adrenaline of any birdwatcher flowing.

There can be no doubt that this was the species that gave rise to the legend of the swansong. The story that swans sang as they died originated in Ancient Greece and throughout the ensuing centuries poets have kept the idea alive, although it has hitherto been treated as a myth by ornithologists. Now those interested in birds are beginning to accept its authenticity. Mentioned rather guardedly in the *Handbook of British Birds* of 1938, the song is described in Volume 1 of the *Handbook of the Birds of the Western Palearctic* published in 1977.

Unlike that of the Mute Swan, the trachea of the Whooper is convolated and it is the final expiration of air from the dying bird's lungs passing through it, that creates the flute-like notes of the short swansong.

BOOK REVIEWS

Larvae of The British Ephemeroptera by **J. M. Elliott, U. H. Humpesch** and **T. T. Macan**. Pp. 145. Scientific Publication No. 49, The Freshwater Biological Association, Ambleside. 1988. £10.

The fourth edition of the *Larvae of the British Ephemeroptera* is in the fine tradition of the Association's publications. In addition to the illustrations from earlier editions, there are six fine drawings by Professor Mizzarro of larvae from different families as well as an excellent key by the same author. The book is in two parts, the first a key to families and species, while the second deals with their ecology in a very comprehensive way. Many aspects are covered: habitats, feeding behaviour, egghatching, larval growth and biomass. There is even a chapter on the applied aspects of ephemeroptera ecology and there are now 19 pages of references.

The check list contains 48 species, including the recently discovered *Caenis pusilla* Navas.; details of synonyms and invalid names are also given. With this new key and the 1983 edition of *The Key to the Adults of the British Ephemeroptera*, both the beginner and the serious entomologist would be well equipped for further studies of this interesting family.

LM

Key Works to the Fauna and Flora of the British Isles and North-western Europe edited by **Reginald W. Sims, Paul Freeman** and **David L. Hawksworth**. Pp. xii + 312. The Systematics Association Special Volume No. 33. Clarendon Press, Oxford. 1988. £35.00.

The 5th edition of this important reference work maintains the high standard set by its predecessor published in 1978; both have been modified to make them more widely applicable, but the present edition is much more comprehensive in its coverage. Of course, the editors have necessarily had to be highly selective in view of the considerable additional systematics work published over the past decade. The editors have called upon a large number of scientists to compile the different taxonomic sections, the whole covering an area which extends from the seas off the west coast of Ireland to the Franco-Swiss frontier and northwards from this line to within the Arctic Circle.

This work will be an invaluable reference source for the many amateur and professional biologists, and should be made available in all libraries, museums and scientific institutions.

MRDS

Flowers of South-West Europe: a field guide by **Oleg Polunin** and **B. E. Smythies**. Pp. xvi + 480, including numerous line drawings, plus 80 pages of full-colour plates. Oxford University Press. 1988. £9.95 paperback.

Since its original publication in 1973, this work has accompanied many a botanist visiting this floristically rich area. In this new paperback format, it will undoubtedly extend its already proven usefulness, enabling it to be included in the luggage of many holidaymakers interested in extending their horizons beyond the beaches and tourist-traps. Such readers should find the extensive introductory material (166 pages) particularly helpful in arriving at an understanding of the climate, landscape and vegetation of Spain, Portugal and south-west France. Over 2400 plants are covered in the remainder of the text, many of which are complemented by full-colour photographs or line drawings. Keys to some of the groups are provided, but it would be advisable to supplement the work with Polunin's *Flowers of Europe*, to which many of the entries are cross-referenced, for a more complete coverage. Amateur and professional botanists owe an enormous debt to the botanical and photographic expertise of Oleg Polunin who, sadly, died in 1985; his remarkable publications have been a source of inspiration and delight to many.

MRDS

Wild Flowers of East Africa by **Michael Blundell**. 464 pages, with many coloured photographs. Collins, 1987. £12.95.

A very well produced hardback in the traditional Collins style, with 864 coloured photographs, most of which are first class. The main text is of necessity brief, consisting of a directory of species giving sufficient basic information on identification and general distribution, including altitude to confirm cross-reference to the colour plates. For those with a passing interest and a desire to put a name to the more obvious flowers and trees of the region, the book is ideal; for those with a deeper knowledge of the subject, then it is a necessary companion.

One criticism, expressed to me by two expert botanists on the shores of Lake Naivasha, concerned the order of the colour plates, which are arranged according to flower colour sections rather than in strict nomenclatural sequence, but this is no real drawback in a working field guide.

JRM

British Fungus Flora 5: Stropariaceae and Coprinaceae p.p. by **Roy Watling** and **Norma M. Gregory**. Pp. 121, including 8 pages of line drawings. Royal Botanic Garden, Edinburgh. 1987. £8.00.

The latest part in a necessary revision, which despite the authors' disclaimer that they consider it to be a preliminary account, will provide mycologists with a standard taxonomic text for the foreseeable future. The present part covers the genera *Hypholoma*, *Melanotus*, *Psilocybe*, *Stropharia*, *Lacrymaria* and *Panaeolus*, with each species receiving meticulously detailed treatment (approximately one page each), together with keys, line drawings (mainly highlighting habit, spores and cystidia) and a useful bibliography.

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Alderson, G., 161
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Archer, M. E., 25–30, 40, 82, 83
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Atkinson, D., 3–19

Baker, R. A., 59–64
Bayliss, R. A., 59–64
Begon, M., 3–19
Blockeel, T. L., 116–118
Bramley, D., 151–152
Bramwell, D., 141–147
Brightman, F. H., 83–84

Cameron, S. A., 65–68
Chicken, E., 78
Coldwell, J. D., 154–155
Crackles, E., 57–58, 74–75

Delany, M. J., 112, 122–123, 124
Densley, M., 38, 39, 85–102, 158–159
Denton, M. L., 147–151, 155, 159

El-Sherbiny, A. H., 102
Ely, W. A., 68, 80, 151, 152, 162–163

Flint, J. H., 20, 69–72
Fryer, G., 111–112

Gilpin, A., 79, 165
Grant, D. R., 76–77, 159–160

Harrison, C. J. O., 84
Heffernan, G., 153
Henderson, A., 31–36
Higginbottom, T., 153–154
Howes, C. A., 124
Humberstone, P., 154

Johnson, P. N., 19

Knight, J. E., 20

Lee, P., 159, 161
Limbert, M., 113–116
Lloyd-Evans, L., 152, 163

Magee, L., 77
Mather, J. R., 167
Medd, T. F., 75–76, 77
Millward, D., 163

Newbould, J. A., 111
Norris, A., 82

Parkin, H., 154
Pashby, B. S., 158
Payne, J., 155–156, 159
Payne, K., 36–37
Pearson, J., 158, 161
Petty, S. J., 73–74

Read, R. W. J., 164
Richardson, D. H. S., 122, 123
Richardson, D. T., 152

Savage, D. P., 151, 153
Seaward, M. R. D., 78, 81, 166
Sheail, J., 125–139
Skidmore, P., 119–122, 140
Sledge, W. A., 84
Smart, L. M., 103–111
Smith, C. J., 162
Smith, J. K., 40, 82
Stewart, P. R., 31–36
Sykes, M. W., 153

Thayre, M. E., 80–81, 84, 124

Usher, M. B., 103–111

Wade, P. M., 21–24
Wall, C., 157–160
Wallis, A. J., 140
Whitfield, J. B., 65–68
Wingfield, M., 21–24

Yalden, D. W., 141–147
Yeates, C. S. V., 151, 157–158, 160, 163

INDEX

Arachnology
Recolonization of burnt and cut heathland by arachnids, 103–111

Biography
Richard Henry Meade: arachnologist, entomologist and surgeon, 59–64; James Clark Ross and Ross's Gull, 85–102; T. W. Woodhead and the study of vegetation and man in the Huddersfield district, 125–139

Book Reviews
20, 24, 38–40, 58, 68, 80–84, 102, 111–112, 139–140, 166–167

Botany
Botanical report for 1986, 74–78; West Moor and its botanical records, 113–116

Bryology
YNU annual report 1986–1987, 116–118

Charophytes
Nitella mucronata var. *gracillima* new to northern Britain, 31–36

Entomology
Changes in grasshopper distribution and abundance in north Merseyside sand dunes, 3–19; Aculeate wasps and bees of Stensall Common, 25–30; Survey of bees along Dean River at Woodford, Cheshire, 65–68; Entomological reports for 1984–86: Coleoptera, 69–72; *Limonia ctenophora* new to Yorkshire, 111; Diptera report 1985–86, 119–122; Entomological reports for 1986–87, Coleoptera: Staphylinidae, 147–151; Curculionidae from Cumbria, 164

Habitat Loss
Hatfield Chase: loss of drainage channel habitat, 21–24

Limnology
Trichopteran larvae of mid and upper Wharfedale, 41–57

Mammals
Unusual winter feeding tactics of foxes on Spurn Peninsula, 19

Mesolithic Birds
Birds from the Mesolithic of Demen's Dale, Derbyshire, 141–147

Ornithology
A very early Yorkshire duck decoy, 57–58; Ground nesting by long-eared owls on restocked sites in upland forests, 73–74; Bearded tit, 79; James Clark Ross and Ross's Gull, 85–102; Whooper Swan, 165

Personalia
Willis Bramley, 36–37

Yorkshire Naturalists' Union
Excursions in 1987, 151–163

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